

## STRUCTURE SEARCH

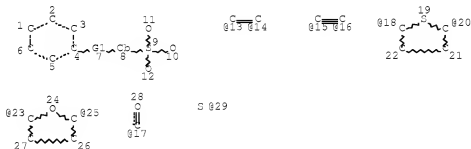
=&gt; d his l51

(FILE 'HCAPLUS' ENTERED AT 10:53:54 ON 13 AUG 2008)

L51 18 S L49 AND L50  
 SAV TEMP L51 WEI394HCP/A

=&gt; d que l51

L6 STR



VAR G1=O/S/13-4 14-8/15-4 16-8/23-4 25-8/18-4 20-8/17/29

NODE ATTRIBUTES:

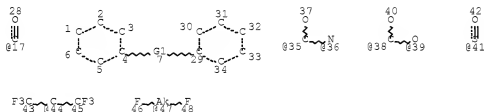
CONNECT IS E1 RC AT 11  
 CONNECT IS E1 RC AT 12  
 CONNECT IS E1 RC AT 28  
 CONNECT IS E2 RC AT 29  
 DEFAULT MLEVEL IS ATOM  
 GG CAT IS UNS AT 8  
 DEFAULT ECLEVEL IS LIMITED  
 ECOUNT IS E6 C AT 8

GRAPH ATTRIBUTES:

RSPEC I  
 NUMBER OF NODES IS 29

STEREO ATTRIBUTES: NONE

L8 16298 SEA FILE=REGISTRY SSS FUL L6  
 L11 STR



VAR G1=17/41/SQ2/35-4 36-29/38-4 39-29/44/47

NODE ATTRIBUTES:

CONNECT IS E1 RC AT 28  
 CONNECT IS E1 RC AT 37  
 CONNECT IS E1 RC AT 40  
 CONNECT IS E1 RC AT 42  
 DEFAULT MLEVEL IS ATOM  
 GG CAT IS SAT AT 47  
 DEFAULT ECLEVEL IS LIMITED  
 ECOUNT IS M1-X10 C AT 47

## GRAPH ATTRIBUTES:

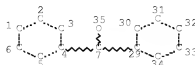
RSPEC I

NUMBER OF NODES IS 29

## STEREO ATTRIBUTES: NONE

L13 3230 SEA FILE=REGISTRY SUB=L8 SSS FUL L11

L15 STR



## NODE ATTRIBUTES:

CONNECT IS E1 RC AT 35

DEFAULT MLEVEL IS ATOM

DEFAULT ECLEVEL IS LIMITED

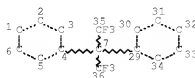
## GRAPH ATTRIBUTES:

RSPEC I

NUMBER OF NODES IS 14

## STEREO ATTRIBUTES: NONE

L16 STR



## NODE ATTRIBUTES:

DEFAULT MLEVEL IS ATOM

DEFAULT ECLEVEL IS LIMITED

## GRAPH ATTRIBUTES:

RSPEC I

NUMBER OF NODES IS 15

## STEREO ATTRIBUTES: NONE

L18 153 SEA FILE=REGISTRY SUB=L8 SSS FUL L15 AND L16  
 L20 157 SEA FILE=HCAPLUS ABB=ON PLU=ON L18  
 L22 2828 SEA FILE=HCAPLUS ABB=ON PLU=ON L13  
 L26 174487 SEA FILE=HCAPLUS ABB=ON PLU=ON "FUEL CELLS"+MAX/CT  
 L27 89664 SEA FILE=HCAPLUS ABB=ON PLU=ON FUEL (2A) CELL?  
 L28 197224 SEA FILE=HCAPLUS ABB=ON PLU=ON L26 OR L27  
 L29 127 SEA FILE=HCAPLUS ABB=ON PLU=ON L20 AND L28  
 L30 565 SEA FILE=HCAPLUS ABB=ON PLU=ON L22 AND L28  
 L31 565 SEA FILE=HCAPLUS ABB=ON PLU=ON L29 OR L30  
 L32 31323 SEA FILE=HCAPLUS ABB=ON PLU=ON ?POLYM? (3A) ELECTROLYT?  
  
 L33 331 SEA FILE=HCAPLUS ABB=ON PLU=ON L31 AND L32  
 L34 QUE ABB=ON PLU=ON MEMBRANE  
 L35 297 SEA FILE=HCAPLUS ABB=ON PLU=ON L33 AND L34  
 L36 54625 SEA FILE=HCAPLUS ABB=ON PLU=ON ION? (2A) CONDUCT?  
 L37 131 SEA FILE=HCAPLUS ABB=ON PLU=ON L35 AND L36  
 L38 267283 SEA FILE=HCAPLUS ABB=ON PLU=ON IONOMERS+MAX/CT  
 L39 257 SEA FILE=HCAPLUS ABB=ON PLU=ON L35 AND L38

## 10/714,394-267960-EIC 1700 SEARCH

L40 275 SEA FILE=HCAPLUS ABB=ON PLU=ON L37 OR L39  
 L41 QUE ABB=ON PLU=ON CATALYST?  
 L42 QUE ABB=ON PLU=ON CATALYSTS+MAX/CT  
 L43 1 SEA FILE=REGISTRY ABB=ON PLU=ON 7440-44-0/RN  
 L44 QUE ABB=ON PLU=ON L43 OR CARBON  
 L45 44912 SEA FILE=HCAPLUS ABB=ON PLU=ON L44(3A)L41  
 L46 36069 SEA FILE=HCAPLUS ABB=ON PLU=ON L44(L)L42  
 L47 21 SEA FILE=HCAPLUS ABB=ON PLU=ON L40 AND (L45 OR L46)  
 L48 QUE ABB=ON PLU=ON ELECTROD? OR CATHOD? OR ANOD? OR (  
 NEGATIVE OR POSITIVE) (2A)ELECTROD?  
 L49 20 SEA FILE=HCAPLUS ABB=ON PLU=ON L47 AND L48  
 L50 QUE ABB=ON PLU=ON FILM? OR THINFILM? OR LAYER? OR OV  
 ERLAY? OR OVERLAD? OR LAMIN? OR LAMEL? OR MULTILAYER?  
 OR SHEET? OR LEAF? OR FOIL? OR COAT? OR TOPCOAT? OR OVE  
 RCOAT? OR VENEER? OR SHEATH? OR COVER? OR ENVELOP? OR E  
 NCASE? OR ENWRAP? OR OVERSPREAD? OR ENCAPSUL?  
 L51 18 SEA FILE=HCAPLUS ABB=ON PLU=ON L49 AND L50

STRUCTURE SEARCH RESULTS

=&gt; d 151 1-18 ibib ed abs hitstr hitind

L51 ANSWER 1 OF 18 HCAPLUS COPYRIGHT 2008 ACS on STN  
 ACCESSION NUMBER: 2008:859827 HCAPLUS Full-text  
 DOCUMENT NUMBER: 149:157223  
 TITLE: Polymer electrolyte  
 membrane/catalyst assembly (MEA), its  
 manufacture, and its hydrogen-fueled  
 polymer electrolyte  
 fuel cells  
 INVENTOR(S): Kitamura, Kota; Sakaguchi, Yoshimitsu;  
 Yamaguchi, Hiroki; Yamashita, Masahiro;  
 Yamada, Takatoshi; Takase, Satoshi; Miyagawa,  
 Shinji  
 PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan; Nissan Motor Co.,  
 Ltd.  
 SOURCE: Jpn. Kokai Tokkyo Koho, 16pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2008166050	A	20080717	JP 2006-352397	2006 1227
PRIORITY APPLN. INFO.:			JP 2006-352397	2006 1227

ED Entered STN: 18 Jul 2008  
 GI

\* STRUCTURE DIAGRAM TOO LARGE FOR DISPLAY - AVAILABLE VIA OFFLINE PRINT  
 \*

AB The MEA contains a polymer electrolyte membrane comprising (1) a polymer represented by the general formula I [n1, n2, m1-m3 = ≥1-integer satisfying n1/(n + n2) = 0.40-0.70, m3/(m1 + m2 + m3) = 0.005-0.05, and m2/(m1 + m2 + m3) = 0.01-0.20] and (2) 5-15% of a polymer II [n3 = ≥1-integer; m4, m5 = ≥1-integer satisfying m5/(m4 + m5) = 0.60-0.80] and an electrode catalyst layer which is bonded directly at least on one side of the polymer electrolyte membrane, where the surface roughness of the membrane/catalyst interface is ≤1 μm. The MEA is prepared by direct application of a catalyst slurry containing an electrode catalyst, a polymer electrolyte and a solvent at least on one side of the polymer electrolyte membrane containing the polymer I and 5-15% of the polymer II in such a way that the surface roughness of the membrane/catalyst interface becomes ≤1 μm. The hydrogen-fueled polymer electrolyte fuel cell shows high output performance even in low moisturizing condition and also shows excellent durability.

IT 1027300-88-4P  
 RI: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (manufacture of polymer electrolyte  
 membrane/electrode assembly for  
 hydrogen-fueled polymer electrolyte  
 fuel cells)

RN 1027300-88-4 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt  
 (1:2), polymer with 2,6-dichlorobenzonitrile, 2-(6-oxido-6H-

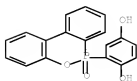
10/714,394-267960-EIC 1700 SEARCH

dibenz[c,e][1,2]oxaphosphorin-6-yl)-1,4-benzenediol and  
4,4'-thiobis[phenol] (CA INDEX NAME)

CM 1

CRN 99208-50-1

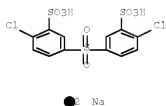
CMF C18 H13 O4 P



CM 2

CRN 51698-33-0

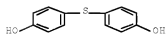
CMF C12 H8 Cl2 O8 S3 . 2 Na



CM 3

CRN 2664-63-3

CMF C12 H10 O2 S



CM 4

CRN 1194-65-6

CMF C7 H3 Cl2 N



- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
- ST hydrogen fueled polymer electrolyte  
fuel cell; polymer electrolyte  
membrane electrode assembly
- IT Carbon black, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(Vulcan XC 72R, gas diffusion layer; manufacture of  
polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Polyoxymethylenes, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(fluorine- and sulfo-containing, ionomers, Nafion; manufacture of  
polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Fluoropolymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(manufacture of polymer electrolyte  
membrane/electrode assembly for  
hydrogen-fueled polymer electrolyte  
fuel cells)
- IT Polysulfones, uses  
RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(polybenzimidazole-; manufacture of polymer  
electrolyte membrane/electrode  
assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Polythioethers  
RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(polyether-polyoxyarylene-polysulfone-, cyano-containing; manufacture of  
polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Polysulfones, uses  
RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(polyether-polyoxyarylene-polythioether-, cyano-containing; manufacture  
of polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Polyoxyarylenes  
RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(polyether-polysulfone-polythioether-, cyano-containing; manufacture of  
polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Fuel cells  
(polymer electrolyte; polymer  
electrolyte membrane/electrode  
assembly (MEA), its manufacture, and its hydrogen-fueled  
polymer electrolyte fuel  
cells)
- IT Fluoropolymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polyoxymethylene-, sulfo-containing, ionomers, Nafion; manufacture of  
polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Ionomers  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polyoxymethylenes, fluorine- and

- sulfo-containing, Nafion; manufacture of polymer electrolyte membrane/ electrode assembly for hydrogen-fueled polymer electrolyte fuel cells)
- IT Polyethers, uses  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (polyoxyarylene-polysulfone-polythioether-, cyano-containing; manufacture of polymer electrolyte membrane/electrode assembly for hydrogen-fueled polymer electrolyte fuel cells)
- IT Polybenzimidazoles  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (polysulfone-; manufacture of polymer electrolyte membrane/electrode assembly for hydrogen-fueled polymer electrolyte fuel cells)
- IT 9002-84-0, Polyflon D 1E  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (carbon paper waterproofed with; manufacture of polymer electrolyte membrane/electrode assembly for hydrogen-fueled polymer electrolyte fuel cells)
- IT 354114-33-3, TGP-H 060  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (gas diffusion layer; manufacture of polymer electrolyte membrane/electrode assembly for hydrogen-fueled polymer electrolyte fuel cells)
- IT 861709-53-7P, 2,5-Dicarboxybenzenesulfonic acid monosodium salt-3,5-dicarboxyphenylphosphonic acid-3',4,4'-tetraaminodiphenylsulfone copolymer  
 1627366-88-4P  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (manufacture of polymer electrolyte membrane/electrode assembly for hydrogen-fueled polymer electrolyte fuel cells)
- IT 7440-06-4, Platinum, uses 7440-44-0, Carbon, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (platinum/carbon electrode catalyst layer; manufacture of polymer electrolyte membrane/electrode assembly for hydrogen-fueled polymer electrolyte fuel cells)

L51 ANSWER 2 OF 18 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2008:859826 HCAPLUS Full-text

TITLE: Polymer electrolyte membrane/catalyst assembly, its manufacture, and hydrogen-fueled fuel cell

INVENTOR(S): Yamashita, Masahiro; Kitamura, Kota; Yamaguchi, Hiroki; Yamada, Takatoshi; Shimizu, Yusuke; Miyagawa, Shinji  
 PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan; Nissan Motor Co., Ltd.

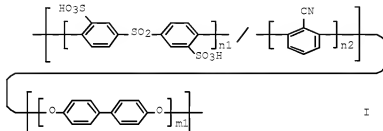
SOURCE: Jpn. Kokai Tokkyo Koho, 16pp.  
 CODEN: JKXXAF

DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

## 10/714,394-267960-EIC 1700 SEARCH

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2008166049	A	20080717	JP 2006-352389	2006 1227
PRIORITY APPLN. INFO.:			JP 2006-352389	2006 1227
ED	Entered STN: 18 Jul 2008			
GI				



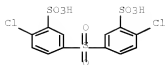
- AB The polymer electrolyte membrane /catalyst assembly contains (1) a polymer electrolyte membrane which contains a polymer I ( $n_1, n_2 = \geq 1$ -integer satisfying  $n_1/(n_1 + n_2) = 0.40-0.70$ ;  $m_1 = \geq 1$ -integer) and shows coefficient of linear expansion at  $150-200^\circ$  (TGA, in N<sub>2</sub>, 30-min dry at  $25^\circ$  followed by heating at  $5^\circ/\text{min}$  to  $350^\circ$ ) in a predetd. range and (2) an electrode catalyst layer which is bonded directly on at least one side of the polymer electrolyte membrane and has been formed by direct application of a catalyst slurry containing Pt/C powder, ionomers, and solvent in such a way that the surface roughness of the membrane/catalyst interface becomes  $\leq 1 \mu\text{m}$ .
- IT 681035-31-4F, 4,4'-Biphenol-2,6-dichlorobenzonitrile-3,3'-disulfo-4,4'-dichlorodiphenylsulfone disodium salt copolymer
- RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)
- (polymer electrolyte membrane/ electrode assembly (MEA), its manufacture, and its hydrogen-fueled polymer electrolyte fuel cells)
- RN 681035-31-4 HCAPLUS
- CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2), polymer with [1,1'-biphenyl]-4,4'-diol and 2,6-dichlorobenzonitrile (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 C12 O8 S3 . 2 Na





● 2 Na

CM 2

CRM 1194-65-6

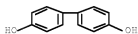
CMF C7 H3 Cl2 N



CM 3

CRM 92-88-6

CMF Cl2 H10 O2



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST polyarylene ether hydrogen fueled fuel cell;  
polymer electrolyte membrane catalyst  
assembly

IT Carbon black

RL: TEM (Technical or engineered material use); USES (Uses)  
(Vulcan XC 72R, gas diffusion layer; manufacture of  
polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)

IT Polyoxoalkylenes

RL: TEM (Technical or engineered material use); USES (Uses)  
(fluorine- and sulfo-containing, ionomers, Nafion; manufacture of  
polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)

IT Fluoropolymers

RL: TEM (Technical or engineered material use); USES (Uses)  
(manufacture of polymer electrolyte  
membrane/electrode assembly for  
hydrogen-fueled polymer electrolyte  
fuel cells)

IT Fuel cells

(polymer electrolyte; polymer  
electrolyte membrane/electrode)

assembly (MEA), its manufacture, and its hydrogen-fueled  
polymer electrolyte fuel  
cells)

## IT Fluoropolymers

RL: TEM (Technical or engineered material use); USES (Uses)  
(polyoxyalkylene-, sulfo-containing, ionomers, Nafion; manufacture of  
polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)

## IT Ionomers

RL: TEM (Technical or engineered material use); USES (Uses)  
(polyoxyalkylenes, fluorine- and  
sulfo-containing, Nafion; manufacture of  
polymer electrolyte membranes/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)

## IT Polysulfones

RL: IMF (Industrial manufacture); POF (Polymer in formulation);  
TEM (Technical or engineered material use); PREP (Preparation);  
USES (Uses)  
(polyoxyphenylene-, oxynitrile-, sulfonic acid group-containing;  
polymer electrolyte membrane/  
electrode assembly (MEA), its manufacture, and its  
hydrogen-fueled polymer electrolyte  
fuel cells)

## IT Polyoxyphenylenes

RL: IMF (Industrial manufacture); POF (Polymer in formulation);  
TEM (Technical or engineered material use); PREP (Preparation);  
USES (Uses)  
(polysulfone-, oxynitrile-, sulfonic acid group-containing;  
polymer electrolyte membrane/  
electrode assembly (MEA), its manufacture, and its  
hydrogen-fueled polymer electrolyte  
fuel cells)

## IT 7440-06-4, Platinum 7440-44-0, Carbon

RL: CAT (Catalyst use); USES (Uses)  
(Pt/carbon electrode catalyst  
layer; manufacture of polymer electrolyte  
membrane/electrode assembly for  
hydrogen-fueled polymer electrolyte  
fuel cells)

## IT 9002-84-0, Polyflon D 1E

RL: TEM (Technical or engineered material use); USES (Uses)  
(carbon paper water-proofed with; manufacture of polymer  
electrolyte membrane/electrode  
assembly for hydrogen-fueled polymer  
electrolyte fuel cells)

## IT 354114-33-3, TGP-H 060

RL: TEM (Technical or engineered material use); USES (Uses)  
(gas diffusion layer; manufacture of polymer  
electrolyte membrane/electrode  
assembly for hydrogen-fueled polymer  
electrolyte fuel cells)

IT 681035-31-4P, 4,4'-Biphenol-2,6-dichlorobenzonitrile-3,3'-  
disulfo-4,4'-dichlorodiphenylsulfone disodium salt  
copolymer

RL: IMF (Industrial manufacture); POF (Polymer in formulation);  
TEM (Technical or engineered material use); PREP (Preparation);  
USES (Uses)  
(polymer electrolyte membrane/  
electrode assembly (MEA), its manufacture, and its  
hydrogen-fueled polymer electrolyte  
fuel cells)

## 10/714,394-267960-EIC 1700 SEARCH

membrane/catalyst assembly, its  
manufacture, and hydrogen-fueled fuel  
cell  
Sakaguchi, Yoshimitsu; Kitamura, Kota;  
Yamaguchi, Hiroki; Yamashita, Masahiro;  
Yamada, Takatoshi; Takase, Satoshi; Miyagawa,  
Shinji

INVENTOR(S):

PATENT ASSIGNEE(S):

SOURCE:

DOCUMENT TYPE:

LANGUAGE:

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

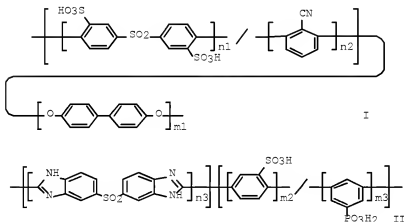
Toyobo Co., Ltd., Japan; Nissan Motor Co.,  
Ltd.  
Jpn. Kokai Tokkyo Koho, 15pp.  
CODEN: JKXXAF

Patent  
Japanese

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2008166037	A	20080717	JP 2006-352154	2006 1227
PRIORITY APPLN. INFO.:			JP 2006-352154	2006 1227

ED Entered STN: 18 Jul 2008

GI



AB The polymer electrolyte membrane /catalyst assembly contains (1) a polymer electrolyte membrane which is composed of 85-95% of a polymer I (n<sub>1</sub>, n<sub>2</sub> = 21-integer satisfying n<sub>1</sub>/(n<sub>1</sub> + n<sub>2</sub>) = 0.40-0.70; m<sub>1</sub> = 21-integer) and 5-15% of a polymer II (n<sub>3</sub> = 21-integer; m<sub>2</sub>, m<sub>3</sub> = 21 integer satisfying m<sub>3</sub>/(m<sub>2</sub> + m<sub>3</sub>) = 0.60-0.80) and (2) an electrode catalyst layer which is bonded directly on at least one side of the polymer electrolyte membrane and has been formed by direct application of a catalyst slurry containing electrode catalysts, polymer electrolytes, and solvents in such a way that the surface roughness of the membrane/catalyst interface becomes ≤1 μm.

IT 581035-31-4P, 4,4'-Biphenol-2,6-dichlorobenzonitrile-3,3'-disulfo-4,4'-dichlorodiphenylsulfone disodium salt

## 10/714,394-267960-EIC 1700 SEARCH

copolymer

RL: IMF (Industrial manufacture); POF (Polymer in formulation);

TEM (Technical or engineered material use); PREP (Preparation);

USES (Uses)

(polymer electrolyte membrane/  
electrode assembly (MEA), its manufacture, and its  
hydrogen-fueled polymer electrolyte  
fuel cells)

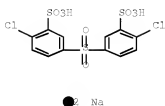
RN 681035-31-4 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt  
(1:2), polymer with [1,1'-biphenyl]-4,4'-diol and  
2,6-dichlorobenzonitrile (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 C12 O8 S3 . 2 Na



CM 2

CRN 1194-65-6

CMF C7 H3 C12 N



CM 3

CRN 92-88-6

CMF C12 H10 O2



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST hydrogen fueled fuel cell; polymer  
electrolyte membrane catalyst assembly

IT Carbon black

RL: TEM (Technical or engineered material use); USES (Uses)

(Vulcan XC 72R, gas diffusion layer; manufacture of

- polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Polyoxyalkylenes  
RL: TEM (Technical or engineered material use); USES (Uses)  
(fluorine- and sulfo-containing, ionomers, Nafion; manufacture of  
polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Fluoropolymers  
RL: TEM (Technical or engineered material use); USES (Uses)  
(manufacture of polymer electrolyte  
membrane/electrode assembly for  
hydrogen-fueled polymer electrolyte  
fuel cells)
- IT Polysulfones  
RL: IMF (Industrial manufacture); POF (Polymer in formulation);  
TEM (Technical or engineered material use); PREP (Preparation);  
USES (Uses)  
(polybenzimidazole-, sulfonic acid and phosphonic acid  
group-containing; polymer electrolyte  
membrane/electrode assembly (MEA), its  
manufacture, and its hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Fuel cells  
(polymer electrolyte; polymer  
electrolyte membrane/electrode  
assembly (MEA), its manufacture, and its hydrogen-fueled  
polymer electrolyte fuel  
cells)
- IT Fluoropolymers  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polyoxyalkylene-, sulfo-containing, ionomers, Nafion; manufacture of  
polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Ionomers  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polyoxyalkylenes, fluorine- and  
sulfo-containing, Nafion; manufacture of  
polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Polysulfones  
RL: IMF (Industrial manufacture); POF (Polymer in formulation);  
TEM (Technical or engineered material use); PREP (Preparation);  
USES (Uses)  
(polyoxyphenylene-, oxynitrile-, sulfonic acid group-containing;  
polymer electrolyte membrane/  
electrode assembly (MEA), its manufacture, and its  
hydrogen-fueled polymer electrolyte  
fuel cells)
- IT Polyoxyphenylenes  
RL: IMF (Industrial manufacture); POF (Polymer in formulation);  
TEM (Technical or engineered material use); PREP (Preparation);  
USES (Uses)  
(polysulfone-, oxynitrile-, sulfonic acid group-containing;  
polymer electrolyte membrane/  
electrode assembly (MEA), its manufacture, and its  
hydrogen-fueled polymer electrolyte  
fuel cells)
- IT Polybenzimidazoles  
RL: IMF (Industrial manufacture); POF (Polymer in formulation);  
TEM (Technical or engineered material use); PREP (Preparation);  
USES (Uses)  
(polysulfone-, sulfonic acid and phosphonic acid group-containing;  
polymer electrolyte membrane/

electrode assembly (MEA), its manufacture, and its hydrogen-fueled polymer electrolyte fuel cells)

IT 7440-06-4, Platinum 7440-44-0, Carbon  
 RL: CAT (Catalyst use); USES (Uses)  
 (Pt/carbon electrode catalyst layer; manufacture of polymer electrolyte membrane/electrode assembly for hydrogen-fueled polymer electrolyte fuel cells)

IT 9002-84-0, Polyflon D 1E  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (carbon paper water-proofed with; manufacture of polymer electrolyte membrane/electrode assembly for hydrogen-fueled polymer electrolyte fuel cells)

IT 354114-33-3, TGP-H 060  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (gas diffusion layer; manufacture of polymer electrolyte membrane/electrode assembly for hydrogen-fueled polymer electrolyte fuel cells)

IT 681035-31-4P, 4,4'-Biphenol-2,6-dichlorobenzonitrile-3,3'-disulfo-4,4'-dichlorodiphenylsulfone disodium salt copolymer 861709-53-7P, 2,5-Dicarboxybenzenesulfonic acid monosodium salt-3,5-dicarboxyphenylphosphonic acid-3,3',4,4'-tetraaminodiphenyl sulfone copolymer  
 RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (polymer electrolyte membrane/electrode assembly (MEA), its manufacture, and its hydrogen-fueled polymer electrolyte fuel cells)

L51 ANSWER 4 OF 18 HCAPLUS COPYRIGHT 2008 ACS on STN  
 ACCESSION NUMBER: 2008:859822 HCAPLUS Full-text  
 DOCUMENT NUMBER: 149:157283  
 TITLE: Polymer electrolyte

membrane/electrode assembly (MEA), its manufacture, and its hydrogen-fueled polymer electrolyte fuel cells

INVENTOR(S): Kitamura, Kota; Sakaguchi, Yoshimitsu; Yamaguchi, Hiroki; Yamashita, Masahiro; Yamada, Takatoshi; Takase, Satoshi; Miyagawa, Shinji

PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan; Nissan Motor Co., Ltd.

SOURCE: Jpn. Kokai Tokyo Koho, 14pp.  
 CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2008166036	A	20080717	JP 2006-352148	2006 1227
PRIORITY APPLN. INFO.:			JP 2006-352148	2006 1227

ED Entered STN: 18 Jul 2008  
GI

\* STRUCTURE DIAGRAM TOO LARGE FOR DISPLAY - AVAILABLE VIA OFFLINE PRINT

AB The MEA contains a polymer electrolyte membrane comprising a polymer represented by the general formula I [n1, n2, m1-m3 = ≥1-integer satisfying n1/(n + n2) = 0.40-0.70, m3/(m1 + m2 + m3) = 0.005-0.05, and m2/(m1 + m2 + m3) = 0.01-0.20] and an electrode catalyst layer which is bonded directly at least on one side of the polymer electrolyte membrane, where the surface roughness of the membrane/catalyst interface is ≤1 μm. The MEA is prepared by direct application of a catalyst slurry containing an electrode catalyst, a polymer electrolyte and a solvent at least on one side of the polymer electrolyte membrane of a polymer I in such a way that the surface roughness of the membrane/catalyst interface becomes ≤1 μm. The hydrogen-fueled polymer electrolyte fuel cell shows high output performance even in low moisturizing condition and also shows excellent durability.

IT 916849-47-3P

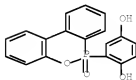
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(manufacture of polymer electrolyte membrane/electrode assembly for hydrogen-fueled polymer electrolyte fuel cells)

RN 916849-47-3 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2), polymer with [1,1'-biphenyl]-4,4'-diol, 2,6-dichlorobenzonitrile, 2-(6-oxido-6H-dibenz[c,e][1,2]oxaphosphorin-6-yl)-1,4-benzenediol and 4,4'-thiobis[phenol] (CA INDEX NAME)

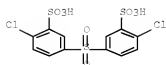
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CRN 99208-50-1  
CMF C18 H13 O4 P



CM 2

CRN 51698-33-0  
CMF C12 H8 Cl2 O8 S3 . 2 Na

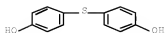


● 2 Na

CM 3

CRN 2664-63-3

CMF C12 H10 O2 S



CM 4

CRN 1194-65-6

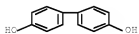
CMF C7 H3 Cl2 N



CM 5

CRN 92-88-6

CMF C12 H10 O2



CC 52-3 (Electrochemical, Radiational, and Thermal Energy Technology)

ST hydrogen fueled polymer electrolyte

fuel cell; polymer electrolyte

membrane electrode assembly

IT Carbon black, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(Vulcan XC 72R, gas diffusion layer; manufacture of

polymer electrolyte membrane/

electrode assembly for hydrogen-fueled polymer

electrolyte fuel cells)

IT Polyoxoalkylenes, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(fluorine- and sulfo-containing, ionomers; manufacture of

polymer electrolyte membrane/

electrode assembly for hydrogen-fueled polymer

electrolyte fuel cells)

IT Fluoropolymers, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(manufacture of polymer electrolyte



- membrane/electrode assembly for  
hydrogen-fueled polymer electrolyte  
fuel cells)
- IT Polythioethers  
RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(polyether-polyoxyarylene-polysulfone-, cyano-containing; manufacture of  
polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Polysulfones, uses  
RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(polyether-polyoxyarylene-polythioether-, cyano-containing; manufacture  
of polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Polyoxyarylenes  
RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(polyether-polysulfone-polythioether-, cyano-containing; manufacture of  
polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Fuel cells  
(polymer electrolyte; polymer  
electrolyte membrane/electrode  
assembly (MEA), its manufacture, and its hydrogen-fueled  
polymer electrolyte fuel  
cells)
- IT Fluoropolymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polyoxyalkylene-, sulfo-containing, ionomers; manufacture of  
polymer electrolyte membrane/  
electrode assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Ionomers  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polyoxyalkylenes, fluorine- and  
sulfo-containing; manufacture of polymer  
electrolyte membrane/electrode  
assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT Polyethers, uses  
RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(polyoxyarylene-polysulfone-polythioether-, cyano-containing;  
manufacture of polymer electrolyte  
membrane/electrode assembly for  
hydrogen-fueled polymer electrolyte  
fuel cells)
- IT 9002-84-0, Polyflon D IE  
RL: TEM (Technical or engineered material use); USES (Uses)  
(carbon paper waterproofed with; manufacture of polymer  
electrolyte membrane/electrode  
assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT 354114-33-3, TGP-H 060  
RL: TEM (Technical or engineered material use); USES (Uses)  
(gas diffusion layer; manufacture of polymer  
electrolyte membrane/electrode  
assembly for hydrogen-fueled polymer  
electrolyte fuel cells)
- IT 916849-47-3P  
RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(manufacture of polymer electrolyte

membrane/electrode assembly for  
hydrogen-fueled polymer electrolyte  
fuel cells)

IT 7440-06-4, Platinum, uses 7440-44-0, Carbon, uses  
RL: CAT (Catalyst use); USES (Uses)  
(platinum/carbon electrode catalyst  
layer; manufacture of polymer electrolyte  
membrane/electrode assembly for  
hydrogen-fueled polymer electrolyte  
fuel cells)

L51 ANSWER 5 OF 18 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2008:859797 HCAPLUS Full-text

DOCUMENT NUMBER: 149:132488

TITLE: Membrane electrode  
assembly (MEA) with proton conductive  
membrane having excellent  
processability and high proton conductivity  
for polymer electrolyte  
fuel cells

INVENTOR(S): Kanaoka, Osayuki; Soma, Hiroshi; Ishimaru,  
Ryuhei

PATENT ASSIGNEE(S): Honda Motor Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 36pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

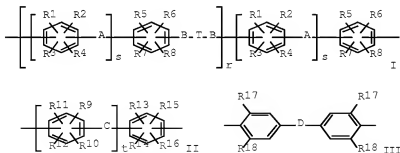
FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2008166003	A	20080717	JP 2006-351050	2006 1227
PRIORITY APPLN. INFO.:			JP 2006-351050	2006 1227

ED Entered STN: 18 Jul 2008

GI



AB In the membrane electrode assembly having a proton-conductive membrane sandwiched with an anode and a cathode, the proton-conductive membrane involves structure units represented by the general formula I [T includes structure units represented by II and includes at least III; A, C =  $\geq 1$  kinds of structure units selected from direct bond, CO, SO<sub>2</sub>, SO, CONH, CO<sub>2</sub>, (CF<sub>2</sub>)<sub>1</sub>, (1 = 1-10 integer), (CH<sub>2</sub>)<sub>1</sub> (1 = 1-10 integer), CR'<sub>2</sub> (R'

## 10/714,394-267960-EIC 1700 SEARCH

= aliphatic hydrocarbyl, aromatic hydrocarbyl, halogenated hydrocarbyl), cyclohexylidene, fluorenylidene, O, S; B = O, S; D = CMe<sub>2</sub>, 1,1-cyclohexylidene; R1-R16 = H, F, alkyl, (partially) halogenated alkyl, allyl, aryl, nitro, nitrile; R17, R18 = H, Me, iso-Pr, iso-Bu, tert-Bu, cyclohexyl; s, t = 0-4 integer; r ≥ 1 integer].

IT 1036334-46-9P 1036334-51-6P  
1036334-55-9P 1036334-58-3P  
1036334-60-7P 1036334-62-9P  
1036334-64-1P 1036334-68-5P  
1036334-72-1P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(membrane electrode assembly with proton-conductive membrane having excellent processability and high proton conductivity for polymer electrolyte fuel cells)

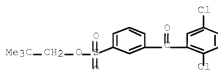
RN 1036334-46-9 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with bis(4-fluorophenyl)methanone, (4-chlorophenyl)(4-fluorophenyl)methanone and 5,5'-(1-methylethylidene)bis[[1,1'-biphenyl]-2-ol], block (CA INDEX NAME)

CM 1

CRN 847972-43-4

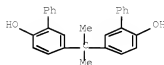
CMF C18 H18 Cl2 O4 S



CM 2

CRN 24038-68-4

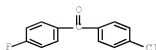
CMF C27 H24 O2



CM 3

CRN 2069-48-9

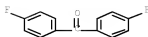
CMF Cl3 H8 Cl F O



CM 4

CRN 345-92-6

CMF C13 H8 F2 O



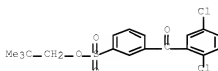
RN 1036334-51-6 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with bis(4-fluorophenyl)methanone, (4-chlorophenyl)(4-fluorophenyl)methanone, 5,5'-(9H-fluoren-9-ylidene)bis[1,1'-biphenyl]-2-ol] and 4,4'-(1-methylethylidene)bis[2,6-dimethylphenol], block (CA INDEX NAME)

CM 1

CRN 847972-43-4

CMF C18 H18 Cl2 O4 S



CM 2

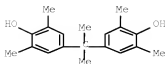
CRN 161256-84-4

CMF C37 H26 O2



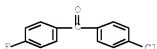
CM 3

CRN 5613-46-7  
CMF C19 H24 O2



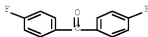
CM 4

CRN 2069-48-9  
CMF C13 H8 Cl F O



CM 5

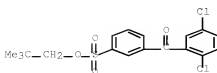
CRN 345-92-6  
CMF C13 H8 F2 O



RN 1036334-55-0 HCAPLUS  
CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with bis(4-fluorophenyl)methanone, (4-chlorophenyl)(4-fluorophenyl)methanone, 5,5'-(9H-fluoren-9-ylidene)bis[[1,1'-biphenyl]-2-ol] and 5,5'-(1-methylethylidene)bis[[1,1'-biphenyl]-2-ol], block (CA INDEX NAME)

CM 1

CRN 847972-43-4  
CMF C18 H18 Cl2 O4 S



CM 2

CRN 161256-84-4

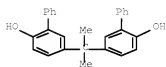
CMF C37 H26 O2



CM 3

CRN 24038-68-4

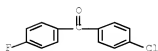
CMF C27 H24 O2



CM 4

CRN 2069-48-9

CMF C13 H8 Cl F O



CM 5

CRN 345-92-6

CMF C13 H8 F2 O



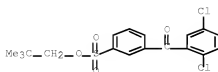
RN 1036334-58-3 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with bis(4-fluorophenyl)methanone, (4-chlorophenyl) (4-fluorophenyl)methanone, 4,4'-cyclohexylidenebis[2,6-dimethylphenol] and 5,5'-(9H-fluoren-9-ylidene)bis[[1,1'-biphenyl]-2-ol], block (CA INDEX NAME)

CM 1

CRN 847972-43-4

CMF C18 H18 C12 O4 S



CM 2

CRN 161256-84-4

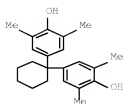
CMF C37 H26 O2



CM 3

CRN 30560-61-3

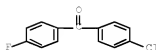
CMF C22 H28 O2



CM 4

CRN 2069-48-9

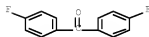
CMF C13 H8 Cl F O



CM 5

CRN 345-92-6

CMF C13 H8 F2 O



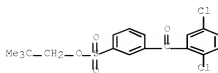
RN 1036334-60-7 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with bis(4-fluorophenyl)methanone, (4-chlorophenyl)(4-fluorophenyl)methanone, 4,4'-cyclohexylidenebis[2-cyclohexylphenol] and 5,5'-(9H-fluoren-9-ylidene)bis[1,1'-biphenyl]-2-ol], block (CA INDEX NAME)

CM 1

CRN 847972-43-4

CMF C18 H18 Cl2 O4 S



CM 2

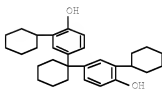


CRN 161256-84-4  
CMF C37 H26 O2



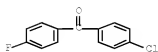
CM 3

CRN 4221-68-5  
CMF C30 H40 O2



CM 4

CRN 2069-48-9  
CMF C13 H8 Cl F O



CM 5

CRN 345-92-6  
CMF C13 H8 F2 O

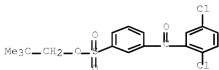


RN 1036334-62-9 HCAPLUS  
 CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with bis(4-fluorophenyl)methanone, (4-chlorophenyl) (4-fluorophenyl)methanone, 4,4'-(1-methylethylidene)bis[2,6-dimethylphenol] and 4,4'-[1,3-phenylenebis(1-methylethylidene)]bis[phenol], block (CA INDEX NAME)

CM 1

CRN 847972-43-4

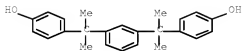
CMF C18 H18 C12 O4 S



CM 2

CRN 13595-25-0

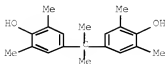
CMF C24 H26 O2



CM 3

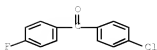
CRN 5613-46-7

CMF C19 H24 O2



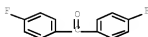
CM 4

CRN 2069-48-9  
CMF C13 H8 Cl F O



CM 5

CRN 345-92-6  
CMF C13 H8 F2 O

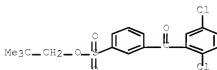


RN 1036334-64-1 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with bis(4-fluorophenyl)methanone, (4-chlorophenyl)(4-fluorophenyl)methanone, 5,5'-(1-methylethylidene)bis[[1,1'-biphenyl]-2-ol] and 4,4'-(1,3-phenylenebis(1-methylethylidene))bis[phenol], block (CA INDEX NAME)

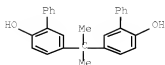
CM 1

CRN 847972-43-4  
CMF C18 H18 Cl2 O4 S



CM 2

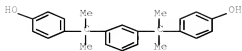
CRN 24038-68-4  
CMF C27 H24 O2



CM 3

CRN 13595-25-0

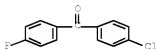
CMF C24 H26 O2



CM 4

CRN 2069-48-9

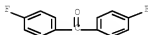
CMF C13 H8 Cl F O



CM 5

CRN 345-92-6

CMF C13 H8 F2 O



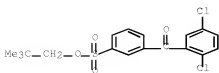
RN 1036334-68-5 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with bis(4-fluorophenyl)methanone, (4-chlorophenyl) (4-fluorophenyl)methanone, 4,4'-cyclohexylidenebis[2,6-dimethylphenol] and 4,4'-[1,3-phenylenebis(1-methylethylidene)]bis[phenol], block (CA INDEX NAME)

CM 1

CRN 847972-43-4

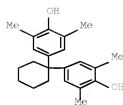
CMF C18 H18 Cl2 O4 S



CM 2

CRN 30560-61-3

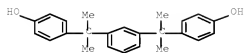
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CM 3

CRN 13595-25-0

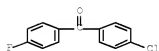
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CM 4

CRN 2069-48-9

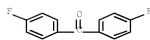
CMF C13 H8 Cl F O



CM 5

CRN 345-92-6

CMF C13 H8 F2 O



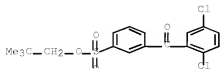
# 10/714,394-267960-EIC 1700 SEARCH

RN 1036334-72-1 HCAPLUS  
 CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with bis(4-fluorophenyl)methanone, (4-chlorophenyl) (4-fluorophenyl)methanone, 4,4'-cyclohexylidenebis[2-cyclohexylphenol] and 4,4'-[1,3-phenylenebis(1-methylethylidene)]bis[phenol] (CA INDEX NAME)

CM 1

CRN 847972-43-4

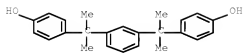
CMF C18 H18 Cl2 O4 S



CM 2

CRN 13595-25-0

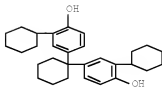
CMF C24 H26 O2



CM 3

CRN 4221-68-5

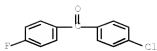
CMF C30 H40 O2



CM 4

CRN 2069-48-9

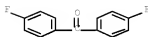
CMF C13 H8 Cl F O



CM 5

CRM 345-92-6

CMF Cl3 H8 F2 O



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST sulfonated polyarylene proton conductive membrane;  
membrane electrode assembly polymer  
electrolyte fuel cell

IT Carbon black, uses

RL: CAT (Catalyst use); USES (Uses)  
(catalyst with platinum; membrane  
electrode assembly with proton-conductive  
membrane having excellent processability and high  
proton conductivity for polymer electrolyte  
fuel cells)

IT Polyoxyalkylenes, uses

RL: TEM (Technical or engineered material use); USES (Uses)  
(fluorine- and sulfo-containing, isomers, ion-  
conductive binder; membrane electrode  
assembly with proton-conductive membrane having  
excellent processability and high proton conductivity for  
polymer electrolyte fuel  
cells)

IT Fluoropolymers, uses

RL: TEM (Technical or engineered material use); USES (Uses)  
(membrane electrode assembly with  
proton-conductive membrane having excellent  
processability and high proton conductivity for polymer  
electrolyte fuel cells)

IT Polyketones

RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(polyether-, sulfo-containing, block, cardo; membrane  
electrode assembly with proton-conductive  
membrane having excellent processability and high  
proton conductivity for polymer electrolyte  
fuel cells)

IT Polyketones

RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(polyether-, sulfo-containing, block; membrane  
electrode assembly with proton-conductive  
membrane having excellent processability and high  
proton conductivity for polymer electrolyte  
fuel cells)

IT Cardo polymers

RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)

- (polyether-polyketones, sulfo-containing, block; membrane electrode assembly with proton-conductive membrane having excellent processability and high proton conductivity for polymer electrolyte fuel cells)
- IT Polyethers, uses  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (polyketone-, sulfo-containing, block, cardo; membrane electrode assembly with proton-conductive membrane having excellent processability and high proton conductivity for polymer electrolyte fuel cells)
- IT Polyethers, uses  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (polyketone-, sulfo-containing, block; membrane electrode assembly with proton-conductive membrane having excellent processability and high proton conductivity for polymer electrolyte fuel cells)
- IT Fuel cells  
 (polymer electrolyte; membrane electrode assembly with proton-conductive membrane having excellent processability and high proton conductivity for polymer electrolyte fuel cells)
- IT Fluoropolymers, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (polyoxyalkylene-, sulfo-containing, ionomers, ion-conductive binder; membrane electrode assembly with proton-conductive membrane having excellent processability and high proton conductivity for polymer electrolyte fuel cells)
- IT Ionomers  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (polyoxyalkylenes, fluorine- and sulfo-containing, ion-conductive binder; membrane electrode assembly with proton-conductive membrane having excellent processability and high proton conductivity for polymer electrolyte fuel cells)
- IT 9002-84-0, Polytetrafluoroethylene  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (carbon black blend, underlying layer on carbon paper, gas diffusion layer; membrane electrode assembly with proton-conductive membrane having excellent processability and high proton conductivity for polymer electrolyte fuel cells)
- IT 7440-06-4, Platinum, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (catalyst with carbon black; membrane electrode assembly with proton-conductive membrane having excellent processability and high proton conductivity for polymer electrolyte fuel cells)
- IT 1036334-44-7P 1036334-48-1P 1036334-53-8P 1036334-57-2P  
 1036334-59-4P 1036334-61-8P 1036334-63-0P 1036334-66-3P  
 1036334-70-9P  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (membrane electrode assembly with proton-conductive membrane having excellent processability and high proton conductivity for polymer



electrolyte fuel cells)  
 IT 1036334-46-5P 1036334-51-6P  
 1036334-55-6P 1036334-58-2P  
 1036334-60-7P 1036334-62-3P  
 1036334-64-1P 1036334-68-5P  
 1036334-72-1P  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (membrane electrode assembly with proton-conductive membrane having excellent processability and high proton conductivity for polymer electrolyte fuel cells)  
 IT 7440-44-0, Carbon, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (paper, gas diffusion layer; membrane electrode assembly with proton-conductive membrane having excellent processability and high proton conductivity for polymer electrolyte fuel cells)

L51 ANSWER 6 OF 18 HCAPLUS COPYRIGHT 2008 ACS on STN  
 ACCESSION NUMBER: 2008:734344 HCAPLUS Full-text  
 DOCUMENT NUMBER: 149:57685  
 TITLE: Membrane electrode assembly having electrode layers with controlled pore-volume distribution, and its manufacture

INVENTOR(S): Kawai, Junji; Higami, Makoto; Wakabayashi, Nobuaki; Nakagawa, Shigeo; Kanaoka, Osayuki; Matsuo, Junji  
 PATENT ASSIGNEE(S): JSR Ltd., Japan; Honda Motor Co., Ltd.  
 SOURCE: Jpn. Kokai Tokkyo Koho, 44pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2008140608	A	20080619	JP 2006-323990	20061130
PRIORITY APPLN. INFO.:			JP 2006-323990	20061130

ED Entered STN: 19 Jun 2008

AB The membrane electrode assembly (MEA) contains an anode and cathode, each containing catalyst particles and polymeric electrolytes, on either side of an ion-conducting membrane. In the anode and/or cathode, the ratio (V2/V1) of the pore volume (V2) within a 50 weight% (based on total electrode weight) region in the thickness direction from the ion-conducting membrane side toward the electrode surface to the pore volume (V1) within a 50 weight% region in the thickness direction from the electrode surface toward the ion-conducting membrane side is ≥85 to <100%. The MEA is manufactured by application of electrode pastes containing polymeric electrolytes (PE) and catalyst particles (CP) in 22 steps to form multilayers on the ion-conducting membrane, wherein the ratio (P1/P2) of PE/CP weight ratio (P1) in electrode pastes for the 2nd and subsequent layers to PE/CP weight ratio (P2) in electrode pastes for the 1st layer is 110-400%. The polymeric electrolytes may be sulfo-containing arylene polymers. The MEA having catalyst layers exhibits high power generation performance and durability.  
 IT 1075133-35-5DP, hydrolyzed

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (electrolyte; manufacture of polymer

# 10/714,394-267960-EIC 1700 SEARCH

electrolyte fuel cell  
membrane-electrode assembly having  
electrode layers with controlled pore-volume  
distribution)

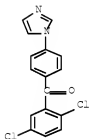
RN 1033133-35-5 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with 2,6-dichlorobenzonitrile, (2,5-dichlorophenyl)[4-(1H-imidazol-1-yl)phenyl]methanone and 4,4'-(2,2,2-trifluoro-1-(trifluoromethyl)ethylenediene)bis[phenol], block (CA INDEX NAME)

CM 1

CRN 919769-45-2

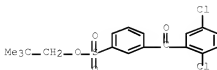
CMF C16 H10 C12 N2 O



CM 2

CRN 847972-43-4

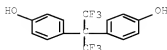
CMF C18 H18 C12 O4 S



CM 3

CRN 1478-61-1

CMF C15 H10 F6 O2



CM 4

CRM 1194-65-6  
CMF C7 H3 C12 N



- RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
(manuf. of polymer electrolyte fuel  
cell membrane-electrode assembly  
having electrode layers with controlled  
pore-vol. distribution)
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 35, 38, 67
- ST polymer electrolyte fuel  
cell membrane electrode;  
cathode anode pore vol catalyst fuel  
cell
- IT Fluoropolymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(acrylic, electrodes containing; manufacture of  
polymer electrolyte fuel  
cell membrane-electrode assembly  
having electrode layers with controlled  
pore-volume distribution)
- IT Polyethers, uses  
RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(aromatic, fluorine- and sulfo-containing, block, electrolyte  
; manufacture of polymer electrolyte  
fuel cell membrane-  
electrode assembly having electrode  
layers with controlled pore-volume distribution)
- IT Polyethers, preparation  
RL: IMF (Industrial manufacture); RCT (Reactant); PREP  
(Preparation); RACT (Reactant or reagent)  
(aromatic, fluorine-containing; manufacture of polymer  
electrolyte fuel cell  
membrane-electrode assembly having  
electrode layers with controlled pore-volume  
distribution)
- IT Oxidation catalysts  
Reduction catalysts  
(electrochem.; manufacture of polymer electrolyte  
fuel cell membrane-  
electrode assembly having electrode  
layers with controlled pore-volume distribution)
- IT Acrylic polymers, uses  
Polyolefins  
RL: TEM (Technical or engineered material use); USES (Uses)  
(fluorine-containing, electrodes containing; manufacture of  
polymer electrolyte fuel  
cell membrane-electrode assembly  
having electrode layers with controlled  
pore-volume distribution)
- IT Water-resistant materials  
(fluoropolymers, electrodes containing; manufacture of  
polymer electrolyte fuel  
cell membrane-electrode assembly)

- having electrode layers with controlled pore-volume distribution)
- IT Fuel cell anodes  
Fuel cell cathodes  
Fuel cell electrolytes  
(manufacture of polymer electrolyte fuel cell membrane-electrode assembly having electrode layers with controlled pore-volume distribution)
- IT Fluoropolymers, uses  
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(polyether-, aromatic, sulfo-containing, block, electrolyte; manufacture of polymer electrolyte fuel cell membrane-electrode assembly having electrode layers with controlled pore-volume distribution)
- IT Fluoropolymers, preparation  
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
(polyether-, aromatic; manufacture of polymer electrolyte fuel cell membrane-electrode assembly having electrode layers with controlled pore-volume distribution)
- IT Fuel cells  
(polymer electrolyte; manufacture of polymer electrolyte fuel cell membrane-electrode assembly having electrode layers with controlled pore-volume distribution)
- IT Ionic conductors  
(polymeric; manufacture of polymer electrolyte fuel cell membrane-electrode assembly having electrode layers with controlled pore-volume distribution)
- IT Fluoropolymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polyolefin-, electrodes containing; manufacture of polymer electrolyte fuel cell membrane-electrode assembly having electrode layers with controlled pore-volume distribution)
- IT 390761-63-4, TEC 10E50E  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst particle; manufacture of polymer electrolyte fuel cell membrane-electrode assembly having electrode layers with controlled pore-volume distribution)
- IT 7440-06-4, Platinum, uses  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst, carbon particle-supported; manufacture of polymer electrolyte fuel cell membrane-electrode assembly having electrode layers with controlled pore-volume distribution)
- IT 613687-03-9, 2-Hydroxyethyl vinyl ether-hexafluoropropylene copolymer  
RL: TEM (Technical or engineered material use); USES (Uses)  
(electrodes containing; manufacture of polymer electrolyte fuel cell membrane-electrode assembly having electrode layers with controlled pore-volume distribution)
- IT 1033133-35-5BP, hydrolyzed

## 10/714,394-267960-EIC 1700 SEARCH

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (electrolyte; manufacture of polymer electrolyte fuel cell membrane-electrode assembly having electrode layers with controlled pore-volume distribution)

- IT 193410-36-5P, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile copolymer  
 193410-37-6P 919769-45-2P, 2,5-Dichloro-4'-(1-imidazolyl)benzophenone 1032133-35-5P  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (manufacture of polymer electrolyte fuel cell membrane-electrode assembly having electrode layers with controlled pore-volume distribution)
- IT 288-32-4, Imidazole, reactions 270903-87-2, 2,5-Dichloro-4'-fluorobenzophenone  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (manufacture of polymer electrolyte fuel cell membrane-electrode assembly having electrode layers with controlled pore-volume distribution)
- IT 7440-44-0, Carbon, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (particles, platinum catalyst supported on; manufacture of polymer electrolyte fuel cell membrane-electrode assembly having electrode layers with controlled pore-volume distribution)

L51 ANSWER 7 OF 18 HCAPLUS COPYRIGHT 2008 ACS on STN  
 ACCESSION NUMBER: 2008:412531 HCAPLUS Full-text  
 DOCUMENT NUMBER: 148:406438  
 TITLE:

Sulfonic acid group-containing polymers, compositions thereof, polyelectrolyte membranes, membrane/electrode assemblies, and fuel cells

INVENTOR(S): Kitamura, Kota; Sakaguchi, Yoshimitsu; Yamaguchi, Hiroki; Yamashita, Masahiro; Sasai, Kosuke  
 PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 37pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2008074946	A	20080403	JP 2006-255281	2006 0921

PRIORITY APPLN. INFO.: JP 2006-255281  
 2006 0921

ED Entered STN: 03 Apr 2008

AB Title polymers have Q1XQ2, Ar1, Z1-p-C6H4Z2-p-C6H4Z1, Z3-p-C6H4-p-C6H4Z3, and Z4Ar2(R2)nZ4 units [X = SO2, CO; Q1 = 2-R1SO3Y-1,4-phenylene; Q2 = 3-R1SO3Y-1,4-phenylene; R1 = C1-10 alkylene, oxyalkylene, aryl group, direct link; Y = H, cation; Z1, Z3, Z4 = O, S; Z2 = O, S, CMe2; C(CF3)2, CH2, cyclohexyl group; Ar1 = electron attractive group-containing bivalent aromatic group; Ar2 = aromatic group; R2 = C2-30

## 10/714,394-267960-EIC 1700 SEARCH

alkyl; n = 1-4]. Thus, disodium 4,4'-dichlorodiphenyl sulfone-3,3'-disulfonate 70.00, 2,6-dichlorobenzonitrile 26.55, 4,4'-biphenol 44.22, bis(4-hydroxyphenyl) sulfide 6.48, and 4-hexylresorcinol 5.77 g were polymerized in NMP in the presence of K<sub>2</sub>CO<sub>3</sub> and mol. sieves, washed, and dried to give a polymer, 7 g of which was dissolved in H<sub>2</sub>O and 2 mol/L H<sub>2</sub>SO<sub>4</sub> successively, washed, and dried to give a polyelectrolyte membrane showing ion exchange capacity 2.20 mequiv/g, proton conductivity 0.066 S/cm at 80° and relative humidity 66%, and good durability in a fuel cell.

IT 1016645-49-9P 1016645-50-2P  
1016645-51-4P 1016645-52-5P  
1016645-53-6P 1016645-54-7P  
1016645-55-8P 1016645-56-9P  
1016645-57-0P 1016645-58-1P  
1016645-59-5P 1016645-61-6P  
1016645-62-7P 1016645-63-8P  
1016645-64-9P

RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(sulfonic acid group-containing polymers for polyelectrolyte membranes for fuel cells)

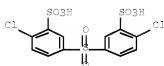
RN 1016645-49-0 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2), polymer with [1,1'-biphenyl]-4,4'-diol, 2,6-dichlorobenzonitrile, 4-hexyl-1,3-benzenediol and 4,4'-thiobis[phenol] (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 C12 O8 S3 . 2 Na

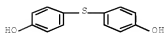


● Na

CM 2

CRN 2664-63-3

CMF C12 H10 O2 S



CM 3

CRN 1194-65-6

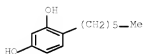
CMF C7 H3 C12 N



CM 4

CRN 136-77-6

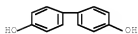
CMF C12 H18 O2



CM 5

CRN 92-88-6

CMF C12 H10 O2



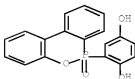
RN 1016645-50-3 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt  
(1:2), polymer with [1,1'-biphenyl]-4,4'-diol,  
2,6-dichlorobenzonitrile, 4-hexyl-1,3-benzenediol,  
2-(6-oxido-6H-dibenz[c,e][1,2]oxaphosphorin-6-yl)-1,4-benzenediol  
and 4,4'-thiobis[phenol] (CA INDEX NAME)

CM 1

CRN 99208-50-1

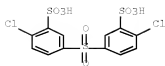
CMF C18 H13 O4 P



CM 2

CRN 51698-33-0

CMF C12 H8 C12 O8 S3 . 2 Na

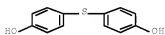


● 2 Na

CM 3

CRN 2664-63-3

CMF C12 H10 O2 S



CM 4

CRN 1194-65-6

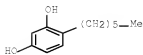
CMF C7 H3 C12 N



CM 5

CRN 136-77-6

CMF C12 H18 O2

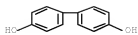


CM 6

CRN 92-88-6

CMF C12 H10 O2



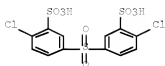


RN 1016645-51-4 HCAPLUS  
 CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt  
 (1:2), polymer with [1,1'-biphenyl]-4,4'-diol,  
 2,6-dichlorobenzonitrile, 4-hexyl-1,3-benzenediol and  
 4,4'-thiobis[benzenethiol] (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

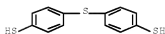


● 2 Na

CM 2

CRN 19362-77-7

CMF C12 H10 S3



CM 3

CRN 1194-65-6

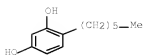
CMF C7 H3 Cl2 N



CM 4

CRN 136-77-6

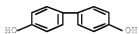
CMF C12 H18 O2



CM 5

CRN 92-88-6

CMF C12 H10 O2



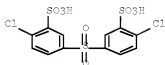
RN 1016645-52-5 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt  
(1:2), polymer with [1,1'-biphenyl]-4,4'-diol,  
2,6-dichlorobenzonitrile, 4-hexyl-1,3-benzenediol and  
4,4'-oxybis[phenol] (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

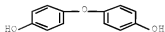


● Na

CM 2

CRN 1965-09-9

CMF C12 H10 O3



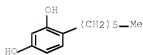
CM 3

CRN 1194-65-6  
CMF C7 H3 C12 N



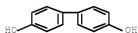
CM 4

CRN 136-77-6  
CMF C12 H18 O2



CM 5

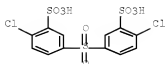
CRN 92-88-6  
CMF C12 H10 O2



RN 1016645-53-6 HCAPLUS  
CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt  
(1:2), polymer with [1,1'-biphenyl]-4,4'-diol,  
2,6-dichlorobenzonitrile, 4-hexyl-1,3-benzenediol and  
4,4'-(1-methylethylidene)bis[phenol] (CA INDEX NAME)

CM 1

CRN 51698-33-0  
CMF C12 H8 Cl2 O8 S3 . 2 Na



• 2 Na

CM 2

CRN 1194-65-6

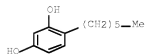
CMF C7 H3 Cl2 N



CM 3

CRN 136-77-6

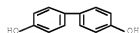
CMF Cl2 H18 O2



CM 4

CRN 92-88-6

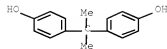
CMF Cl2 H10 O2



CM 5

CRN 80-05-7

CMF Cl5 H16 O2



RN 1016645-54-7 HCAPLUS

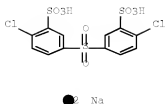
CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt  
(1:2), polymer with [1,1'-biphenyl]-4,4'-diol,  
2,6-dichlorobenzonitrile, 4-hexyl-1,3-benzenediol and  
4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol]

(CA INDEX NAME)

CM 1

CRN 51698-33-0

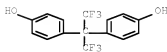
CMF C12 H8 Cl2 O8 S3 . 2 Na



CM 2

CRN 1478-61-1

CMF C15 H10 F6 O2



CM 3

CRN 1194-65-6

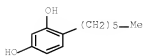
CMF C7 H3 Cl2 N



CM 4

CRN 136-77-6

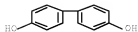
CMF C12 H18 O2



CM 5

CRN 92-88-6

CMF C12 H10 O2



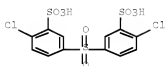
RN 1016645-55-8 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt  
(1:2), polymer with [1,1'-biphenyl]-4,4'-diol,  
4,4'-cyclohexylidenebis[phenol], 2,6-dichlorobenzonitrile and  
4-hexyl-1,3-benzenediol (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na



● 2 Na

CM 2

CRN 1194-65-6

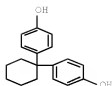
CMF C7 H3 Cl2 N



CM 3

CRN 843-55-0

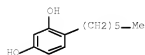
CMF C18 H20 O2



CM 4

CRM 136-77-6

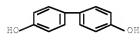
CMF C12 H18 O2



CM 5

CRM 92-88-6

CMF C12 H10 O2



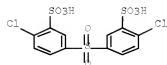
RN 1016645-56-9 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt  
(1:2), polymer with [1,1'-biphenyl]-4,4'-diol,  
2,6-dichlorobenzonitrile, 4-hexyl-1,3-benzenediol and  
4,4'-methylenebis[phenol] (CA INDEX NAME)

CM 1

CRM 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na



● 2 Na

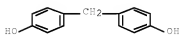
CM 2

CRN 1194-65-6  
CMF C7 H3 C12 N



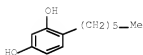
CM 3

CRN 620-92-8  
CMF C13 H12 O2



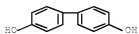
CM 4

CRN 136-77-6  
CMF C12 H18 O2



CM 5

CRN 92-88-6  
CMF C12 H10 O2



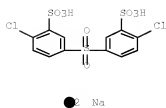
RN 1016645-57-0 HCAPLUS  
CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2), polymer with [1,1'-biphenyl]-4,4'-diol, 2,6-dichlorobenzonitrile, 4-(1,1,3,3-tetramethylbutyl)-1,3-benzenediol and 4,4'-thiobis[phenol] (CA INDEX NAME)

CM 1

CRN 51698-33-0



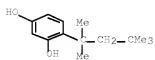
CMF C12 H8 C12 O8 S3 . 2 Na



CM 2

CRN 28122-52-3

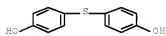
CMF C14 H22 O2



CM 3

CRN 2664-63-3

CMF C12 H10 O2 S



CM 4

CRN 1194-65-6

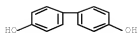
CMF C7 H3 C12 N



CM 5

CRN 92-88-6

CMF C12 H10 O2



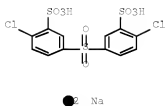
RN 1016645-58-1 HCAPLUS

CM Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt  
(1:2), polymer with [1,1'-biphenyl]-4,4'-diol,  
2,6-dichlorobenzonitrile, 2-(1,1-dimethylethyl)-1,4-benzenediol  
and 4,4'-thiobis[phenol] (CA INDEX NAME)

CM 1

CRN 51698-33-0

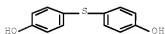
CMF C12 H8 Cl2 O8 S3 . 2 Na



CM 2

CRN 2664-63-3

CMF C12 H10 O2 S



CM 3

CRN 1948-33-0

CMF C10 H14 O2



CM 4

CRN 1194-65-6  
CMF C7 H3 Cl2 N



CM 5

CRN 92-88-6  
CMF Cl2 H10 O2

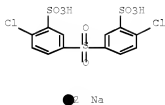


RN 1016645-60-5 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt  
(1:2), polymer with [1,1'-biphenyl]-4,4'-diol,  
2-hexyl-1,4-benzenediol, 1,1'-sulfonylbis[4-chlorobenzene] and  
4,4'-thiobis[phenol] (CA INDEX NAME)

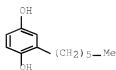
CM 1

CRN 51698-33-0  
CMF Cl2 H8 Cl2 O8 S3 . 2 Na



CM 2

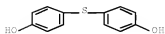
CRN 4197-72-2  
CMF Cl2 H18 O2



CM 3

CRM 2664-63-3

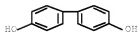
CMF C12 H10 O2 S



CM 4

CRM 92-88-6

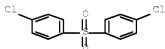
CMF C12 H10 O2



CM 5

CRM 80-07-9

CMF C12 H8 Cl2 O2 S



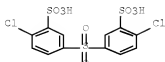
RN 1016645-61-6 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt  
(1:2), polymer with [1,1'-biphenyl]-4,4'-diol,  
bis(4-chlorophenyl)methanone, 2-hexyl-1,4-benzenediol and  
4,4'-thiobis[phenol] (CA INDEX NAME)

CM 1

CRM 51698-33-0

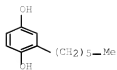
CMF C12 H8 Cl2 O8 S3 . 2 Na


 Na

CM 2

CRM 4197-72-2

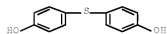
CMF C12 H18 O2



CM 3

CRM 2664-63-3

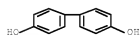
CMF C12 H10 O2 S



CM 4

CRM 92-88-6

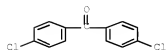
CMF C12 H10 O2



CM 5

CRM 90-98-2

CMF C13 H8 Cl2 O



RN 1016645-62-7 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-chloro-, sodium salt  
(1:2), polymer with [1,1'-biphenyl]-4,4'-diol,

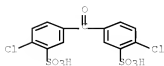
# 10/714,394-267960-EIC 1700 SEARCH

2,6-dichlorobenzonitrile, 2-hexyl-1,4-benzenediol and  
4,4'-thiobis[phenol] (CA INDEX NAME)

CM 1

CRM 57004-46-3

CMF C13 H8 Cl2 O7 S2 . 2 Na

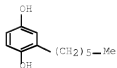


● 2 Na

CM 2

CRM 4197-72-2

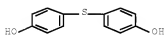
CMF C12 H18 O2



CM 3

CRM 2664-63-3

CMF C12 H10 O2 S



CM 4

CRM 1194-65-6

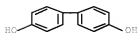
CMF C7 H3 Cl2 N



CM 5

CRN 92-88-6

CMF C12 H10 O2



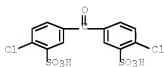
RN 1016645-63-8 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-chloro-, sodium salt  
(1:2), polymer with [1,1'-biphenyl]-4,4'-diol,  
2-hexyl-1,4-benzenediol, 1,1'-sulfonylbis[4-chlorobenzene] and  
4,4'-thiobis[phenol] (CA INDEX NAME)

CM 1

CRN 57004-46-3

CMF C13 H8 Cl2 O7 S2 . 2 Na

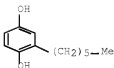


● 2 Na

CM 2

CRN 4197-72-2

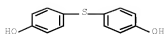
CMF C12 H18 O2



CM 3

CRN 2664-63-3

CMF C12 H10 O2 S



CM 4

CRN 92-88-6

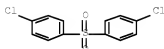
CMF C12 H10 O2



CM 5

CRN 80-07-9

CMF C12 H8 Cl2 O2 S



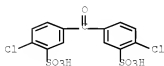
RN 1016645-64-9 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-chloro-, sodium salt (1:2), polymer with [1,1'-biphenyl]-4,4'-diol, bis(4-chlorophenyl)methanone, 2-hexyl-1,4-benzenediol and 4,4'-thiobis[phenol] (CA INDEX NAME)

CM 1

CRN 57004-46-3

CMF C13 H8 Cl2 O7 S2 . 2 Na



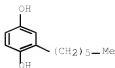
2 Na

CM 2

CRN 4197-72-2

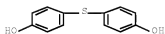
CMF C12 H18 O2





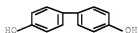
CM 3

CRM 2664-63-3  
CMF C12 H10 O2 S



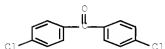
CM 4

CRM 92-88-6  
CMF C12 H10 O2



CM 5

CRM 90-98-2  
CMF C13 H8 Cl2 O



- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38
- ST sulfo polyether polysulfone polythioether polyelectrolyte  
membrane fuel cell
- IT Polyoxyalkylenes, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(fluorine- and sulfo-containing, ionomers, Nafion; sulfonic acid  
group-containing polymers for polyelectrolyte membranes  
for fuel cells)
- IT Polysulfones, uses  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical

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- or engineered material use); PREP (Preparation); USES (Uses)  
(polyether-, aromatic, cardo; sulfonic acid group-containing polymers  
for polyelectrolyte membranes for fuel  
cells)
- IT Polysulfones, uses  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical  
or engineered material use); PREP (Preparation); USES (Uses)  
(polyether-, aromatic, fluorine-containing; sulfonic acid group-containing  
polymers for polyelectrolyte membranes for  
fuel cells)
- IT Polysulfones, uses  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical  
or engineered material use); PREP (Preparation); USES (Uses)  
(polyether-, aromatic; sulfonic acid group-containing polymers for  
polyelectrolyte membranes for fuel  
cells)
- IT Polythioethers  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical  
or engineered material use); PREP (Preparation); USES (Uses)  
(polyether-polyketone-, aromatic; sulfonic acid group-containing  
polymers for polyelectrolyte membranes for  
fuel cells)
- IT Polythioethers  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical  
or engineered material use); PREP (Preparation); USES (Uses)  
(polyether-polyketone-polysulfone-, aromatic; sulfonic acid  
group-containing polymers for polyelectrolyte membranes  
for fuel cells)
- IT Polysulfones, uses  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical  
or engineered material use); PREP (Preparation); USES (Uses)  
(polyether-polyketone-polythioether-, aromatic; sulfonic acid  
group-containing polymers for polyelectrolyte membranes  
for fuel cells)
- IT Fluoropolymers, uses  
Polythioethers  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical  
or engineered material use); PREP (Preparation); USES (Uses)  
(polyether-polysulfone-, aromatic; sulfonic acid group-containing  
polymers for polyelectrolyte membranes for  
fuel cells)
- IT Polyketones  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical  
or engineered material use); PREP (Preparation); USES (Uses)  
(polyether-polysulfone-polythioether-, aromatic; sulfonic acid  
group-containing polymers for polyelectrolyte membranes  
for fuel cells)
- IT Cardo polymers  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical  
or engineered material use); PREP (Preparation); USES (Uses)  
(polyether-polysulfones, aromatic; sulfonic acid group-containing  
polymers for polyelectrolyte membranes for  
fuel cells)
- IT Polyketones  
Polysulfones, uses  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical  
or engineered material use); PREP (Preparation); USES (Uses)  
(polyether-polythioether-, aromatic; sulfonic acid group-containing  
polymers for polyelectrolyte membranes for  
fuel cells)
- IT Polyethers, uses  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical  
or engineered material use); PREP (Preparation); USES (Uses)  
(polyketone-polysulfone-polythioether-, aromatic; sulfonic acid  
group-containing polymers for polyelectrolyte membranes  
for fuel cells)
- IT Polyethers, uses

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- RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(polyketone-polythioether-, aromatic; sulfonic acid group-containing polymers for polyelectrolyte membranes for fuel cells)
- IT Fuel cells  
(polymer electrolyte, direct methanol; sulfonic acid group-containing polymers for polyelectrolyte membranes for fuel cells)
- IT Fluoropolymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polyoxyalkylene-, sulfo-containing, ionomers, Nafion; sulfonic acid group-containing polymers for polyelectrolyte membranes for fuel cells)
- IT Ionomers  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polyoxyalkylenes, fluorine- and sulfo-containing, Nafion; sulfonic acid group-containing polymers for polyelectrolyte membranes for fuel cells)
- IT Polyethers, uses  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(polysulfone-, aromatic, cardo; sulfonic acid group-containing polymers for polyelectrolyte membranes for fuel cells)
- IT Polyethers, uses  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(polysulfone-, aromatic, fluorine-containing; sulfonic acid group-containing polymers for polyelectrolyte membranes for fuel cells)
- IT Polyethers, uses  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(polysulfone-, aromatic; sulfonic acid group-containing polymers for polyelectrolyte membranes for fuel cells)
- IT Polyethers, uses  
RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(polysulfone-polythioether-, aromatic; sulfonic acid group-containing polymers for polyelectrolyte membranes for fuel cells)
- IT Fuel cell electrodes  
Fuel cell electrolytes  
Polyelectrolytes  
(sulfonic acid group-containing polymers for polyelectrolyte membranes for fuel cells)
- IT 7440-06-4, Platinum, uses 7440-18-8, Ruthenium, uses  
RL: CAT (Catalyst use); USES (Uses)  
(carbon-supported, catalyst for fuel cells; sulfonic acid group-containing polymers for polyelectrolyte membranes for fuel cells)
- IT 501004-25-7, TEC 61E54 918428-94-1, TEC 10V40E  
RL: CAT (Catalyst use); USES (Uses)  
(catalyst for fuel cells; sulfonic acid group-containing polymers for polyelectrolyte membranes for fuel cells)
- IT 1016645-45-0P 1016645-50-2P  
1016645-51-4P 1016645-52-5P  
1016645-53-6P 1016645-54-7P  
1016645-55-8P 1016645-56-9P  
1016645-57-0P 1016645-58-1P  
1016645-60-5P 1016645-61-6P  
1016645-62-7P 1016645-63-8P

## 10714,394-267960-EIC 1700 SEARCH

L016645-64-9P

RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(sulfonic acid group-containing polymers for polyelectrolyte membranes for fuel cells)

IT 354114-33-3, TGPH 060 582300-03-6, Nafion SE 20192  
RL: TEM (Technical or engineered material use); USES (Uses)  
(sulfonic acid group-containing polymers for polyelectrolyte membranes for fuel cells)

L51 ANSWER 8 OF 18 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2007:435110 HCAPLUS Full-text

DOCUMENT NUMBER: 146:405272

TITLE: Membrane-electrode assemblies (MEA) containing dissolution-suppressed Ru, their manufacture, and direct methanol fuel cells therewith

INVENTOR(S): Uete, Takao; Kono, Satoshi; Kidai, Masayuki

PATENT ASSIGNEE(S): Toray Industries, Inc., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 15pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2007103293	A	20070419	JP 2005-294895	2005 1007

PRIORITY APPLN. INFO.: JP 2005-294895 2005  
1007

ED Entered STN: 20 Apr 2007

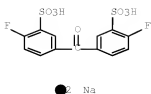
AB The title MEA, suppressing Ru in anode catalysts from dissolving and giving good durability to the fuel cells, have Ru-containing anode catalyst layers (A) and satisfy Ru(0)/Ru(tot)  $\geq 40\%$  within  $\leq 5\text{-}\mu\text{m}$ -depth surface region and Ru(cross)/Ru(tot)  $\leq 2\%$  [Ru(0) = 0-valent Ru in A; Ru(tot) = total Ru in A; Ru(cross) = Ru crossed-over from A to cathode catalyst layers] when applied with 50-mA/cm<sup>2</sup> current for 100 h. The MEA are manufactured by these steps; submersing Ru-containing catalysts for plural times in aqueous solns. and/or organic solvents with different pH and drying, kneading the resulting catalysts with polymer solns., and applying the catalysts on electrode substrates or on electrolyte membranes. All the above steps are carried out in N-containing atmospheric. Dissolvable Ru can be preliminary removed from the cells, avoiding its crossover to cathode sides.

IT 210531-45-6P, Disodium 3,3'-disulfonate-4,4'-difluorobenzophenone

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
(DMFC containing dissoln.-suppressed Ru in anode catalyst layers and showing stable performance)

RN 210531-45-6 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, sodium salt (1:2) (CA INDEX NAME)

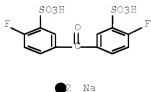


IT 362772-94-9DP, 4,4'-Difluorobenzophenone-disodium  
 3,3'-disulfonate-4,4'-difluorobenzophenone-4,4'-(9H-fluoren-9-  
 ylidene)bisphenol copolymer, hydrolyzed  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered  
 material use); PREP (Preparation); USES (Uses)  
 (electrolytes; DMFC containing dissoln.-suppressed Ru in  
 anode catalyst layers and showing stable  
 performance)  
 RN 862772-94-9 HCAPLUS  
 CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, sodium salt  
 (1:2), polymer with bis(4-fluorophenyl)methanone and  
 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (CA INDEX NAME)

CM 1

CRN 210531-45-6

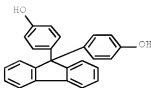
CMF C13 H8 F2 O7 S2 . 2 Na



CM 2

CRN 3236-71-3

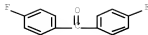
CMF C25 H18 O2



CM 3

CRN 345-92-6

CMF C13 H8 F2 O



- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
- ST direct methanol fuel cell ruthenium catalyst  
dissoln prevention; ruthenium anode catalyst crossover  
prevention DMFC
- IT Controlled atmospheres  
Fuel cell electrolytes  
(DMFC containing dissoln.-suppressed Ru in anode catalyst  
layers and showing stable performance)
- IT Fluoropolymers, uses  
RL: PEP (Physical, engineering or chemical process); TEM  
(Technical or engineered material use); PROC (Process); USES  
(Uses)  
(DMFC containing dissoln.-suppressed Ru in anode catalyst  
layers and showing stable performance)
- IT Polyoxyalkylenes, uses  
RL: CAT (Catalyst use); PEP (Physical, engineering or chemical  
process); PROC (Process); USES (Uses)  
(fluorine- and sulfo-containing, ionomers, cathode  
catalysts; DMFC containing dissoln.-suppressed Ru in anode  
catalyst layers and showing stable performance)
- IT Polyketones  
RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(fluorine-containing, electrolytes; DMFC containing dissoln.-suppressed  
Ru in anode catalyst layers and showing  
stable performance)
- IT Fluoropolymers, uses  
RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(polyketone-, electrolytes; DMFC containing  
dissoln.-suppressed Ru in anode catalyst  
layers and showing stable performance)
- IT Fuel cells  
(polymer electrolyte, direct methanol; DMFC  
containing dissoln.-suppressed Ru in anode catalyst  
layers and showing stable performance)
- IT Fluoropolymers, uses  
RL: CAT (Catalyst use); PEP (Physical, engineering or chemical  
process); PROC (Process); USES (Uses)  
(polyoxyalkylene-, sulfo-containing, ionomers, cathode  
catalysts; DMFC containing dissoln.-suppressed Ru in anode  
catalyst layers and showing stable performance)
- IT Ionomers  
RL: CAT (Catalyst use); PEP (Physical, engineering or chemical  
process); PROC (Process); USES (Uses)  
(polyoxyalkylenes, fluorine- and  
sulfo-containing, cathode catalysts;  
DMFC containing dissoln.-suppressed Ru in anode catalyst  
layers and showing stable performance)
- IT 210531-45-6P, Disodium 3,3'-disulfonate-4,4'-  
difluorobenzophenone  
RL: IMF (Industrial manufacture); RCT (Reactant); PREP  
(Preparation); RACT (Reactant or reagent)  
(DMFC containing dissoln.-suppressed Ru in anode catalyst  
layers and showing stable performance)
- IT 67-63-0, 2-Propanol, uses 1310-73-2, Sodium hydroxide, uses  
7647-01-0, Hydrochloric acid, uses  
RL: NUU (Other use, unclassified); USES (Uses)

## 10/714,394-267960-EIC 1700 SEARCH

- (DMFC containing dissoln.-suppressed Ru in anode catalyst layers and showing stable performance)
- IT 345-92-6, 4,4'-Difluorobenzophenone 7647-14-5, Sodium chloride, reactions 7664-93-9, Sulfuric acid, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (DMFC containing dissoln.-suppressed Ru in anode catalyst layers and showing stable performance)
- IT 7440-44-0, Carbon, uses  
 RL: CAT (Catalyst use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
 (Ru- and Pt-supporting, anode catalysts; DMFC containing dissoln.-suppressed Ru in anode catalyst layers and showing stable performance)
- IT 7440-06-4, Platinum, uses 7440-18-8, Ruthenium, uses  
 RL: CAT (Catalyst use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)  
 (anode catalysts, carbon-supported; DMFC containing dissoln.-suppressed Ru in anode catalyst layers and showing stable performance)
- IT 24937-79-9, Poly(vinylidene fluoride)  
 RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
 (anode components; DMFC containing dissoln.-suppressed Ru in anode catalyst layers and showing stable performance)
- IT 9002-84-0, Polytetrafluoroethylene  
 RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
 (carbon paper treated with, anodes; DMFC containing dissoln.-suppressed Ru in anode catalyst layers and showing stable performance)
- IT 918656-63-0, LT 1400  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (cathodes; DMFC containing dissoln.-suppressed Ru in anode catalyst layers and showing stable performance)
- IT 862772-94-9DP, 4,4'-Difluorobenzophenone-disodium 3,3'-disulfonate-4,4'-difluorobenzophenone-4,4'-(9H-fluoren-9-ylidene)bisphenol copolymer, hydrolyzed  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (electrolytes; DMFC containing dissoln.-suppressed Ru in anode catalyst layers and showing stable performance)
- IT 7727-37-9, Nitrogen, uses  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (manufacturing atmospheric; DMFC containing dissoln.-suppressed Ru in anode catalyst layers and showing stable performance)
- IT 863658-60-0, TGP-H 60  
 RL: PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)  
 (waterproofed, anodes; DMFC containing dissoln.-suppressed Ru in anode catalyst layers and showing stable performance)

L51 ANSWER 9 OF 18 HCAPLUS COPYRIGHT 2008 ACS on STN  
 ACCESSION NUMBER: 2007:223810 HCAPLUS [Full-text](#)  
 DOCUMENT NUMBER: 146:299214  
 TITLE: Fuel cell catalysts containing carbonaceous materials, their films, membrane-electrode assemblies, and polymer electrolyte

## 10/714,394-267960-EIC 1700 SEARCH

INVENTOR(S): Fuel cells  
 INASAKI, Takeshi; NOMURA, Kimiatsu  
 PATENT ASSIGNEE(S): Fuji Photo Film Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 64pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2007053086	A	20070301	JP 2006-199261	2006 0721
PRIORITY APPLN. INFO.:			JP 2005-211856	A 2005 0721

ED Entered STN: 01 Mar 2007

AB The catalysts contain carbonaceous material supports bonded to polymers bearing solvolysis- and heat-resistant groups, and ionic functional groups via solvolysis- and heat-resistant linkages. The films contain the catalysts, solid electrolytes, and optionally other carbonaceous material-containing catalysts without the polymers. The membrane-electrode assemblies show high catalyst utilization efficiency and good durability.

IT 72355-90-9DP, reaction product with bromopentoxylated carbon black or carbon nanotube 146673-85-0DP, reaction product with bromopentoxylated carbon black or carbon nanotube 142047-78-3DP, reaction product with bromopentoxylated carbon black 342047-79-4DP, reaction product with bromopentoxylated carbon black 927679-95-6DP, reaction product with bromopentoxylated carbon black 927679-96-7DP, reaction product with bromopentoxylated carbon black

RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)

(catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)

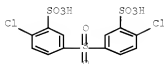
RN 72355-90-9 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2), polymer with 4,4'-(1-methylethylidene)bis[phenol] (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

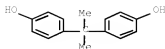


● 2 Na

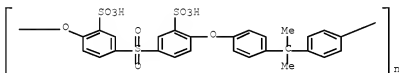
CM 2



CRN 80-05-7  
CMF C15 H16 O2



RN 146673-85-0 HCAPLUS  
CN Poly[oxy(2-sulfo-1,4-phenylene)sulfonyl(3-sulfo-1,4-phenylene)oxy-1,4-phenylene(1-methylethylidene)-1,4-phenylene sodium salt (1:2)]  
(CA INDEX NAME)

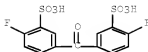


●2 Na

RN 342047-78-3 HCAPLUS  
CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, sodium salt (1:2), polymer with 4,4'-(1-methylethylidene)bis[phenol] (CA INDEX NAME)

CM 1

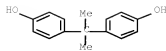
CRN 210531-45-6  
CMF C13 H8 F2 O7 S2 . 2 Na



●2 Na

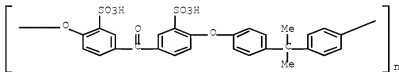
CM 2

CRN 80-05-7  
CMF C15 H16 O2



RN 342047-79-4 HCAPLUS

CN Poly[oxy(2-sulfo-1,4-phenylene)carbonyl(3-sulfo-1,4-phenylene)oxy-1,4-phenylene(1-methylethylidene)-1,4-phenylene sodium salt (1:2)] (CA INDEX NAME)



● 2 Na

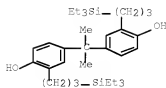
RN 927679-95-6 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2), polymer with 4,4'-(1-methylethylidene)bis[2-[3-(triethylsilyl)propyl]phenol] (CA INDEX NAME)

CM 1

CRN 917383-95-0

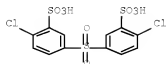
CMF C33 H56 O2 S12



CM 2

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

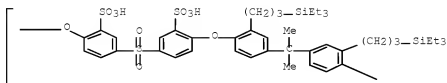


● 2 Na

RN 927679-96-7 HCAPLUS

CN Poly[oxy(2-sulfo-1,4-phenylene)sulfonyl(3-sulfo-1,4-phenylene)oxy[2-[3-(triethylsilyl)propyl]-1,4-phenylene](1-methylethylidene)[3-[3-(triethylsilyl)propyl]-1,4-phenylene] sodium salt (1:2)] (CA INDEX NAME)

PAGE 1-A



● Na

PAGE 1-B

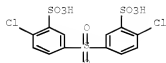


IT 51698-33-0P 210531-45-6P, 3,3'-Disulfo-4,4'-difluorobenzophenone disodium salt

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent) (catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)

RN 51698-33-0 HCAPLUS

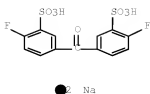
CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2)] (CA INDEX NAME)



● Na

RN 210531-45-6 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, sodium salt (1:2)] (CA INDEX NAME)



IT 927675-72-7P  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (electrolyte membrane; catalyst films  
 containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)

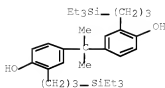
RN 927675-72-7 HCAPLUS

CM Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2), polymer with 4,4'-(1-methylethylidene)bis[2-[3-(triethylsilyl)propyl]phenol] and 1,1'-sulfonylbis[4-chlorobenzene] (CA INDEX NAME)

CM 1

CRN 917383-95-0

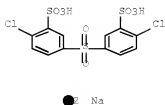
CMF C33 H56 O2 S12



CM 2

CRN 51698-33-0

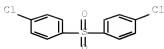
CMF C12 H8 Cl2 O8 S3 . 2 Na



CM 3

CRN 80-07-9

CMF C12 H8 Cl2 O2 S



- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38
- ST ionic polymer carbonaceous support fuel cell  
catalyst; fuel cell catalyst heat solvolysis  
resistance
- IT Carbon black, uses  
RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP  
(Preparation); USES (Uses)  
(Carbon ECP, Denka Black HS 100, reaction products with  
sulfo-containing polymers; catalyst films containing  
carbonaceous materials with ionic functional groups for  
polymer electrolyte fuel  
cells)
- IT Nanotubes  
(carbon, multilayer, bromo derivs., reaction products  
with sulfo-containing polyether-polysulfones; catalyst  
films containing carbonaceous materials with ionic  
functional groups for polymer electrolyte  
fuel cells)
- IT Fuel cell electrodes  
Fuel cell electrolytes  
(catalyst films containing carbonaceous materials with  
ionic functional groups for polymer  
electrolyte fuel cells)
- IT Catalysts  
(electrocatalysts; catalyst films containing carbonaceous  
materials with ionic functional groups for polymer  
electrolyte fuel cells)
- IT Polyoxyalkylenes, uses  
RL: CAT (Catalyst use); USES (Uses)  
(fluorine- and sulfo-containing, ionomers, protonic  
conductors; catalyst films containing  
carbonaceous materials with ionic functional groups for  
polymer electrolyte fuel  
cells)
- IT Polysulfones, uses  
RL: CAT (Catalyst use); IMF (Industrial manufacture); TEM  
(Technical or engineered material use); PREP (Preparation); USES  
(Uses)  
(polyether-, chloromethylated, reaction product with sodium  
mercaptopropanesulfonate; catalyst films containing  
carbonaceous materials with ionic functional groups for  
polymer electrolyte fuel  
cells)
- IT Polysulfones, uses  
RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP  
(Preparation); USES (Uses)  
(polyether-, polystyrene-, graft, sulfo-containing, reaction  
products with carbon black; catalyst  
films containing carbonaceous materials with ionic  
functional groups for polymer electrolyte  
fuel cells)
- IT Polysulfones, uses  
RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP  
(Preparation); USES (Uses)  
(polyether-, sulfo-containing, reaction products with carbon black  
or carbon nanotubes; catalyst films)

- containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Polyketones  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (polyether-, sulfo-containing, reaction products with carbon black; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Polyethers, uses  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (polyketone-, sulfo-containing, reaction products with carbon black; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Fuel cells  
 (polymer electrolyte; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Fluoropolymers, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (polyoxyalkylene-, sulfo-containing, ionomers, protonic conductors; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Ionomers  
 RL: CAT (Catalyst use); USES (Uses)  
 (polyoxyalkylenes, fluorine- and sulfo-containing, protonic conductors; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Polyethers, uses  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (polysulfone-, chloromethylated, reaction product with sodium mercaptopropanesulfonate; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Polyethers, uses  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (polysulfone-, polystyrene-, graft, sulfo-containing, reaction products with carbon black; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Polyethers, uses  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (polysulfone-, sulfo-containing, reaction products with carbon black or carbon nanotubes; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Polysulfones, uses  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (sulfo- and triethylsilyl-containing; catalyst films

## 10/714,394-267960-EIC 1700 SEARCH

containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)

- IT 111-24-ODP, 1,5-Dibromopentane, reaction product with carbon black and sulfo-containing polyether-polysulfone 3229-00-3DP, Pentaerythrityl tetrabromide, reaction product with carbon black and sulfo- and triethylsilyl-containing polyether-polysulfone 7440-06-4P, Platinum, uses 25135-51-7DP, reaction product with carbon black bromo derivative, chloromethylated, graft polymer with lithium sulfopropylloxystyrene and trimethylsilyloxystyrene, hydrolyzed 25154-01-2DP, reaction product with carbon black bromo derivative, chloromethylated, graft polymer with lithium sulfopropylloxystyrene and trimethylsilyloxystyrene, hydrolyzed 72755-90-9DP, reaction product with bromopentoxylated carbon black or carbon nanotube 146672-85-ODP, reaction product with bromopentoxylated carbon black or carbon nanotube 342047-78-3DP, reaction product with bromopentoxylated carbon black 342047-79-4DP, reaction product with bromopentoxylated carbon black 904911-37-1DP, graft copolymer with carbon black-bound chloromethylated polyether-polysulfone and trimethylsilylpropylloxystyrene, hydrolyzed 927679-95-6DP, reaction product with bromopentoxylated carbon black 927679-96-7DP, reaction product with bromopentoxylated carbon black 927679-98-9DP, graft copolymer with carbon black-bound chloromethylated polyether-polysulfone and lithium sulfopropylloxystyrene, hydrolyzed 927679-99-ODP, reaction product with carbon black  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT 107-30-2DP, Chloromethyl methyl ether, reaction product with carbon black-bound polyether-polysulfone, graft polymer with lithium sulfopropylloxystyrene and trimethylsilylpropylloxystyrene, hydrolyzed  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT 51698-33-OP 210531-45-6P, 3,3'-Disulfo-4,4'-difluorobenzophenone disodium salt 904911-37-1P 917383-95-OP 927679-98-9P 927679-99-OP  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT 17636-10-1DP, Sodium 3-mercapto-1-propanesulfonate, reaction product with chloromethylated polyether-polysulfone 25135-51-7DP, chloromethylated, reaction product with sodium mercaptopropanesulfonate 927675-72-7P  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (electrolyte membrane; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT 264217-10-9, Nafion 1135  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (electrolyte membrane; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)

## 10/714,394-267960-EIC 1700 SEARCH

- IT 1120-71-4, Propanesultone 2628-16-2, 4-Vinylphenyl acetate  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (manufacture of (sulfopropoxy)styrene Li salt from; catalyst  
 films containing carbonaceous materials with ionic  
 functional groups for polymer electrolyte  
 fuel cells)
- IT 617-86-7, Triethylsilane 1745-89-7, 2,2'-Diallylbisphenol A  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (manufacture of bis(triethylsilylpropyl)bisphenol A from; catalyst  
 films containing carbonaceous materials with ionic  
 functional groups for polymer electrolyte  
 fuel cells)
- IT 80-07-9, 4,4'-Dichlorodiphenyl sulfone  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (manufacture of disulfodichlorodiphenylsulfone disodium salt from;  
 catalyst films containing carbonaceous materials with  
 ionic functional groups for polymer  
 electrolyte fuel cells)
- IT 345-92-6, 4,4'-Difluorobenzophenone  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (manufacture of disulfodifluorobenzophenone disodium salt from;  
 catalyst films containing carbonaceous materials with  
 ionic functional groups for polymer  
 electrolyte fuel cells)
- IT 2344-83-4, (3-Chloropropyl)trimethylsilane  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (manufacture of trimethylsilylpropoxystyrene from; catalyst  
 films containing carbonaceous materials with ionic  
 functional groups for polymer electrolyte  
 fuel cells)
- IT 7440-44-ODP, Carbon, bromo derivative, reaction product with  
 sulfo-containing polyether-polysulfone  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP  
 (Preparation); USES (Uses)  
 (nanotubes, multilayer; catalyst films  
 containing carbonaceous materials with ionic functional groups for  
 polymer electrolyte fuel  
 cells)

L51 ANSWER 10 OF 18 HCAPLUS COPYRIGHT 2008 ACS ON STN

ACCESSION NUMBER: 2007:223806 HCAPLUS Full-text

DOCUMENT NUMBER: 146:277710

TITLE: Fuel cell catalysts  
 containing carbonaceous materials, their  
 films, membrane-  
 electrode assemblies, and  
 polymer electrolyte  
 fuel cells

INVENTOR(S): Inasaki, Takeshi; Nomura, Kimiatsu

PATENT ASSIGNEE(S): Fuji Photo Film Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokyo Koho, 38pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2007053082	A	20070301	JP 2006-194374	2006 0714
PRIORITY APPLN. INFO.:		JP 2005-211857	A	2005 0721



## 10/714,394-267960-EIC 1700 SEARCH

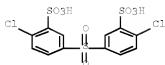
ED Entered STN: 01 Mar 2007

AB The catalysts contain carbonaceous material supports bonded to ionic functional groups via solvolysis- and heat-resistant linkages. The films contain the catalysts, solid electrolytes, and optionally other carbonaceous material-containing catalysts without ionic functional groups. The membrane-electrode assemblies show high catalyst utilization efficiency and good durability.

IT 51698-33-0E, 3,3'-Disulfo-4,4'-dichlorodiphenyl sulfone disodium salt  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)

RN 51698-33-0 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2) (CA INDEX NAME)



● 2 Na

IT 927675-72-7P  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (protonic conductor; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)

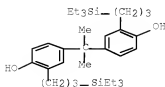
RN 927675-72-7 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, sodium salt (1:2), polymer with 4,4'-(1-methylethylidene)bis[2-[3-(triethylsilyl)propyl]phenol] and 1,1'-sulfonylbis[4-chlorobenzene] (CA INDEX NAME)

CM 1

CRN 917383-95-0

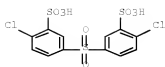
CMF C33 H56 O2 Si2



CM 2

CRN 51698-33-0

CMF C12 H8 C12 O8 S3 . 2 Na

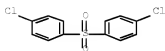


● 2 Na

CM 3

CRM 80-07-9

CMF Cl2 H8 Cl2 O2 S



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

ST ionic carbonaceous support fuel cell catalyst;

fuel cell catalyst heat solvolysis resistance

IT Carbon black, uses

RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)

(Ketjenblack EC-P, Denka Black HS 100, ionic functional group-bonded; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)

IT Nanotubes

(carbon, multilayer, reaction product with (sulfopropoxy)aniline; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)

IT Fuel cell electrodes

Fuel cell electrolytes

(catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)

IT Catalysts

(electrocatalysts; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)

IT Polyoxymethylenes, uses

RL: CAT (Catalyst use); USES (Uses)

(fluorine- and sulfo-containing, ionomers, protonic conductors; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)

IT Polysulfones, uses

RL: CAT (Catalyst use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(polyether-, chloromethylated, reaction product with sodium mercaptopropanesulfonate; catalyst films containing

# 10/714,394-267960-EIC 1700 SEARCH

- carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Polysulfones, uses  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (polyether-, polystyrene-, graft, sulfo-containing; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Fuel cells  
 (polymer electrolyte; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Fluoropolymers, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (polyoxyalkylene-, sulfo-containing, ionomers, protonic conductors; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Ionomers  
 RL: CAT (Catalyst use); USES (Uses)  
 (polyoxyalkylenes, fluorine- and sulfo-containing, protonic conductors; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Polyethers, uses  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (polysulfone-, chloromethylated, reaction product with sodium mercaptopropanesulfonate; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Polyethers, uses  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (polysulfone-, polystyrene-, graft, sulfo-containing; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT Polysulfones, uses  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (sulfo- and triethylsilyl-containing; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT 108-73-6DP, 1,3,5-Trihydroxybenzene, reaction product with bromopentyl-bound carbon black and propanesultone  
 111-24-0DP, 1,5-Dibromopentane, reaction product with carbon black, sulfonated 1120-71-4DP, Propanesultone, reaction product with carbon black 3229-00-3DP, Pentaerythrityl tetrabromide, reaction product with carbon black, sulfonated 3542-44-7DP, Sodium 3-hydroxypropanesulfonate, reaction products with carbon black 7440-06-4P, Platinum, uses 93632-20-3DP, reaction products with carbon nanotube or carbon black  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)

## 10/714,394-267960-EIC 1700 SEARCH

- IT 51696-33-0P, 3,3'-Disulfo-4,4'-dichlorodiphenyl sulfone disodium salt 93632-20-3P, 4-(3-Sulfopropoxy)aniline 904911-37-1P, 4-(3-Sulfopropoxy)styrene lithium salt 917383-95-0P, 3,3'-Bis(triethylsilylpropyl)bisphenol A  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT 264217-10-9, Nafion 1135  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (electrolyte membrane; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT 1120-71-4, Propanesultone 2628-16-2, 4-Vinylphenyl acetate  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (manufacture of (sulfopropoxy)styrene Li salt from; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT 617-86-7, Triethylsilane 1745-89-7, 2,2'-Diallylbisphenol A  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (manufacture of bis(triethylsilylpropyl)bisphenol A from; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT 80-07-9, 4,4'-Dichlorodiphenyl sulfone  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (manufacture of disulfodichlorodiphenylsulfone disodium salt from; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT 103-90-2, p-Acetamidophenol  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (manufacture of ionic compound from; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT 7440-44-0DP, Carbon, reaction products with (sulfopropoxy)aniline  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (nanotubes, multilayer; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT 107-30-2DP, Chloromethyl methyl ether, reaction products with polyether-polysulfone and sodium mercaptosulfonate 17636-10-1DP, Sodium 3-mercaptopropanesulfonate, reaction products with chloromethylated polyether-polysulfone 25135-51-7DP, chloromethylated, reaction products with sodium mercaptopropanesulfonate  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (protonic conductor and electrolyte membrane; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)
- IT 904911-37-1DP, graft copolymer with chloromethylated polyether-polysulfone, hydrolyzed 927675-72-7P  
 RL: CAT (Catalyst use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (protonic conductor; catalyst films containing carbonaceous materials with ionic functional groups for polymer electrolyte fuel cells)

(cells)

L51 ANSWER 11 OF 18 HCAPLUS COPYRIGHT 2008 ACS on STN  
 ACCESSION NUMBER: 2007:197669 HCAPLUS Full-text  
 DOCUMENT NUMBER: 146:255346  
 TITLE: Manufacture of membrane-electrode assembly (MEA) of polymer-electrolyte  
 INVENTOR(S): Komatsu, Satoshi; Otsuki, Toshitaka; Fukuda, Kaoru; Takahashi, Ryoichiro; Shinkai, Hiroshi  
 PATENT ASSIGNEE(S): Jsr Ltd., Japan; Honda Motor Co., Ltd.  
 SOURCE: Jpn. Kokai Tokkyo Koho, 18pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2007048557	A	20070222	JP 2005-230722	2005 0809
PRIORITY APPLN. INFO.:			JP 2005-230722	2005 0809

ED Entered STN: 22 Feb 2007

AB The manufacture includes steps of (1) soaking an aromatic polymer electrolyte membrane in a solvent, (2) applying a catalyst paste containing the polymer electrolyte on the membrane containing 20-60% of the solvent, and drying to give a catalyst layer. Alternatively, first catalyst layer is previously formed on the aromatic polymer electrolyte membrane prior to soaking in a solvent, and then second catalyst layer is formed in the same manner as that above claimed. The solvent may be aqueous C<sub>6</sub> alc., or water. The aromatic electrolyte may be sulfo-containing poly(alkyl)arylenes. The electrolyte membranes have uniform thickness and show high adhesion to the electrode layers, thereby fuel cells employing the MEA achieve high power generation efficiency.

IT 908342-30-3DP, hydrolyzed

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (electrolytes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)

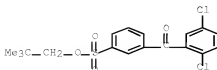
RN 908342-30-3 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with 1,1'-(1,3-phenylene)bis[1-(4-chlorophenyl)methanone] and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (CA INDEX NAME)

CM 1

CRN 847972-43-4

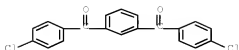
CMF C18 H18 Cl2 O4 S



CM 2

CRN 22198-44-3

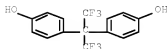
CMF C20 H12 Cl2 O2



CM 3

CRN 1478-61-1

CMF Cl5 H10 F6 O2



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38

ST fuel cell electrolyte arom  
polymer membrana soaking solvent;  
polymer electrolyte fuel cell  
electrode catalyst paste coating; sulfo arom  
fluoropolymer polyether polyketone fuel cell  
electrolyte

IT Polyelectrolytes  
(aromatic; manufacture of membrane-electrode  
assembly of polymer-electrolyte  
fuel cells by using aromatic polymers)

IT Carbon black, uses  
RL: CAT (Catalyst use); TEM (Technical or engineered material  
use); USES (Uses)

(catalyst supports in electrodes; manufacture of  
membrane-electrode assembly of  
polymer-electrolyte fuel  
cells by using aromatic polymers)

IT Fuel cell electrodes  
(coating of catalyst paste; manufacture of  
membrane-electrode assembly of  
polymer-electrolyte fuel  
cells by using aromatic polymers)

IT Fuel cell electrolytes  
(manufacture of membrane-electrode assembly of  
polymer-electrolyte fuel  
cells by using aromatic polymers)

IT Coating process  
(pastes, in forming electrodes; manufacture of  
membrane-electrode assembly of  
polymer-electrolyte fuel  
cells by using aromatic polymers)

IT Polyketones  
RL: IMF (Industrial manufacture); RCT (Reactant); PREP  
(Preparation); RACT (Reactant or reagent)  
(polyether-, fluorine-containing, electrolytes; manufacture of

- membrane-electrode assembly of  
polymer-electrolyte fuel  
cells by using aromatic polymers)
- IT Fluoropolymers, preparation  
RL: IMF (Industrial manufacture); RCT (Reactant); PREP  
(Preparation); RACT (Reactant or reagent)  
(polyether-polyketone-, electrolytes; manufacture of  
membrane-electrode assembly of  
polymer-electrolyte fuel  
cells by using aromatic polymers)
- IT Polyethers, preparation  
RL: IMF (Industrial manufacture); RCT (Reactant); PREP  
(Preparation); RACT (Reactant or reagent)  
(polyketone-, fluorine-containing, electrolytes; manufacture of  
membrane-electrode assembly of  
polymer-electrolyte fuel  
cells by using aromatic polymers)
- IT Fuel cells  
(polymer electrolyte; manufacture of  
membrane-electrode assembly of  
polymer-electrolyte fuel  
cells by using aromatic polymers)
- IT 7440-06-4, Platinum, uses  
RL: CAT (Catalyst use); TEM (Technical or engineered material  
use); USES (Uses)  
(catalysts in electrodes; manufacture of membrane  
-electrode assembly of polymer-  
electrolyte fuel cells by using  
aromatic polymers)
- IT 390761-63-4, TEC 10E50E  
RL: CAT (Catalyst use); TEM (Technical or engineered material  
use); USES (Uses)  
(catalysts supported on catalysts, in electrodes;  
manufacture of membrane-electrode assembly of  
polymer-electrolyte fuel  
cells by using aromatic polymers)
- IT 908342-30-3DP, hydrolyzed  
RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(electrolytes; manufacture of membrane-electrode  
assembly of polymer-electrolyte  
fuel cells by using aromatic polymers)
- IT 125776-08-1P 908342-29-0P, 1,3,-Bis(4-(4-chlorobenzoyl)benzene-2,2-  
bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane  
copolymer  
RL: IMF (Industrial manufacture); RCT (Reactant); PREP  
(Preparation); RACT (Reactant or reagent)  
(precursor of polymer electrolytes; manufacture  
of membrane-electrode assembly of  
polymer-electrolyte fuel  
cells by using aromatic polymers)
- IT 67-56-1, Methanol, uses 872-50-4, N-Methylpyrrolidone, uses  
RL: NUU (Other use, unclassified); USES (Uses)  
(solvents in dope casting of polymer membranes;  
manufacture of membrane-electrode assembly of  
polymer-electrolyte fuel  
cells by using aromatic polymers)

L51 ANSWER 12 OF 18 HCAPLUS COPYRIGHT 2008 ACS ON STN

ACCESSION NUMBER: 2007:197668 HCAPLUS Full-text

DOCUMENT NUMBER: 146:255345

TITLE: Manufacture of membrane-  
electrode assembly (MEA) of  
polymer-electrolyte  
fuel cells

INVENTOR(S): Komatsu, Satoshi; Otsuki, Toshitaka; Fukuda,  
Kaoru; Takahashi, Ryoichiro; Shinkai, Hiroshi

## 10/714,394-267960-EIC 1700 SEARCH

PATENT ASSIGNEE(S): Jsr Ltd., Japan; Honda Motor Co., Ltd.  
 SOURCE: Jpn. Kokai Tokkyo Koho, 16pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2007048556	A	20070222	JP 2005-230721	2005 0809
PRIORITY APPLN. INFO.:			JP 2005-230721	2005 0809

ED Entered STN: 22 Feb 2007

AB The manufacture includes steps of (1) forming an aromatic polymer electrolyte membrane on a temporary support, (2) forming first catalyst layer on the membrane by applying and drying a paste containing catalyst-carrying carbon, aromatic polymer electrolyte, pore former, and solvent, (3) peeling the support off the membrane, (4) forming second catalyst layer in the same manner as that of 2, and (5) removing solvents from the electrolyte membranes. The aromatic electrolyte may be sulfo-containing poly(alkyl)arylenes. The electrolyte membrane may be formed by dope casting process. The electrolyte membranes show high adhesion to the electrodes, thereby fuel cells employing the MEA achieve high power generation efficiency.

IT 855602-04-9DP, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate copolymer, free acids

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (electrolytes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)

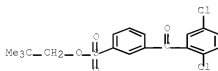
RN 855602-04-9 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with 2,6-dichlorobenzonitrile and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol]  
 (CA INDEX NAME)

CM 1

CRN 847972-43-4

CMF C18 H18 Cl2 O4 S

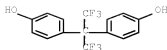


CM 2

CRN 1478-61-1

CMF C15 H10 F6 O2





CM 3

CRM 1194-65-6

CMF C7 H3 Cl2 N



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

ST fuel cell electrolyte arom

polymer membrane electrode assembly;

polymer electrolyte fuel cell

dope casting solvent removal; electrode catalyst paste

coating polymer electrolyte

fuel cell; sulfo arom fluoropolymer

polyether fuel cell electrolyte

IT Carbon fibers, uses

RL: HUU (Other use, unclassified); USES (Uses)

(VGCF, pore formers in forming electrodes; manufacture of

membrane-electrode assembly of

polymer-electrolyte fuel

cells by using aromatic polymers)

IT Polyelectrolytes

(aromatic; manufacture of membrane-electrode

assembly of polymer-electrolyte

fuel cells by using aromatic polymers)

IT Carbon black, uses

RL: CAT (Catalyst use); TEM (Technical or engineered material

use); USES (Uses)

(catalyst supports in electrodes; manufacture of

membrane-electrode assembly of

polymer-electrolyte fuel

cells by using aromatic polymers)

IT Fuel cell electrodes

(coating of catalyst paste; manufacture of

membrane-electrode assembly of

polymer-electrolyte fuel

cells by using aromatic polymers)

IT Polyethers, preparation

RL: IMF (Industrial manufacture); RCT (Reactant); PREP

(Preparation); RACT (Reactant or reagent)

(fluorine-containing, electrolytes; manufacture of membrane-

electrode assembly of polymer-

electrolyte fuel cells by using

aromatic polymers)

IT Fuel cell electrolytes

(manufacture of membrane-electrode assembly of

polymer-electrolyte fuel

cells by using aromatic polymers)

IT Coating process

- (pastes, in forming electrodes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)
- IT Fluoropolymers, preparation  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (polyether-, electrolytes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)
- IT Fuel cells  
 (polymer electrolyte; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)
- IT 7440-06-4, Platinum, uses  
 RL: CAT (Catalyst use); TEM (Technical or engineered material use); USES (Uses)  
 (catalysts in electrodes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)
- IT 390761-63-4, TEC 10E50E  
 RL: CAT (Catalyst use); TEM (Technical or engineered material use); USES (Uses)  
 (catalysts supported on catalysts, in electrodes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)
- IT 855602-94-9EP, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate copolymer, free acids  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (electrolytes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)
- IT 193410-36-5P, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile copolymer  
 193410-37-6P, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile copolymer, sru  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (precursor of electrolytes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)
- IT 67-56-1, Methanol, uses 872-50-4, N-Methylpyrrolidone, uses  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (solvents in dope casting of polymer membranes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)

L51 ANSWER 13 OF 18 HCAPLUS COPYRIGHT 2008 ACS ON STN  
 ACCESSION NUMBER: 2007:197666 HCAPLUS Full-text  
 DOCUMENT NUMBER: 146:255343  
 TITLE: Manufacture of membrane-electrode assembly (MEA) of polymer-electrolyte fuel cells

INVENTOR(S): Komatsu, Satoshi; Otsuki, Toshitaka; Fukuda, Kaoru; Takahashi, Ryoichiro; Shinkai, Hiroshi

## 10/714,394-267960-EIC 1700 SEARCH

PATENT ASSIGNEE(S): Jsr Ltd., Japan; Honda Motor Co., Ltd.  
 SOURCE: Jpn. Kokai Tokkyo Koho, 15pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2007048555	A	20070222	JP 2005-230720	2005 0809
PRIORITY APPLN. INFO.:			JP 2005-230720	2005 0809

ED Entered STN: 22 Feb 2007

AB The manufacture includes steps of (1) forming a solid polymer electrolyte membrane on a temporary support by dope casting process, (2) forming first catalyst layer on the membrane by applying and drying a paste containing catalyst-carrying carbon, aromatic polymer electrolyte, pore former, and solvent, (3) peeling the support off the membrane, and (4) forming second catalyst layer in the same manner as that of 2. The aromatic electrolyte may be sulfo-containing poly(alkyl)arylenes. The electrolyte membranes show high adhesion to the electrode layers, thereby fuel cells employing the MEA achieve high power generation efficiency.

IT 855602-04-9EP, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate copolymer, free acids

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (electrolytes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)

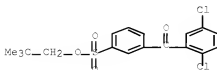
RN 855602-04-9 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with 2,6-dichlorobenzonitrile and 4,4'-(2,2,2-trifluoro-1-(trifluoromethyl)ethyldiene)bis[phenol]  
 (CA INDEX NAME)

CM 1

CRN 847972-43-4

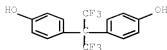
CMF C18 H18 Cl2 O4 S



CM 2

CRN 1478-61-1

CMF C15 H10 F6 O2



CM 3

CRM 1194-65-6

CMF C7 H3 Cl2 N



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

ST fuel cell electrolyte arom

polymer membrane dope casting; polymer

electrolyte fuel cell

electrode catalyst paste coating; sulfo arom

fluoropolymer polyether fuel cell

electrolyte

IT Carbon fibers, uses

RL: NUU (Other use, unclassified); USES (Uses)

(VGCF, pore formers in forming electrodes; manufacture of

membrane-electrode assembly of

polymer-electrolyte fuel

cells by using aromatic polymers)

IT Casting of polymeric materials

(aromatic polymer electrolytes; manufacture of

membrane-electrode assembly of

polymer-electrolyte fuel

cells by using aromatic polymers)

IT Polyelectrolytes

(aromatic; manufacture of membrane-electrode

assembly of polymer-electrolyte

fuel cells by using aromatic polymers)

IT Carbon black, uses

RL: CAT (Catalyst use); TEM (Technical or engineered material

use); USES (Uses)

(catalyst supports in electrodes; manufacture of

membrane-electrode assembly of

polymer-electrolyte fuel

cells by using aromatic polymers)

IT Fuel cell electrodes

(coating of catalyst paste; manufacture of

membrane-electrode assembly of

polymer-electrolyte fuel

cells by using aromatic polymers)

IT Polyethers, preparation

RL: IMF (Industrial manufacture); RCT (Reactant); PREP

(Preparation); RACT (Reactant or reagent)

(fluorine-containing, electrolytes; manufacture of membrane-

electrode assembly of polymer-

electrolyte fuel cells by using

aromatic polymers)

IT Fuel cell electrolytes

- (manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)
- IT Coating process  
(pastes, in forming electrodes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)
- IT Fluoropolymer, preparation  
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
(polyether-, electrolytes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)
- IT Fuel cells  
(polymer electrolyte; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)
- IT 7440-06-4, Platinum, uses  
RL: CAT (Catalyst use); TEM (Technical or engineered material use); USES (Uses)  
(catalysts in electrodes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)
- IT 390761-63-4, TEC 10E50E  
RL: CAT (Catalyst use); TEM (Technical or engineered material use); USES (Uses)  
(catalysts supported on catalysts, in electrodes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)
- IT 855602-04-9DP, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate copolymer, free acids  
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(electrolytes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)
- IT 193410-36-5P, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile copolymer  
193410-37-6P, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile copolymer, sru  
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
(precursor of electrolytes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)
- IT 67-56-1, Methanol, uses 872-50-4, N-Methylpyrrolidone, uses  
RL: NUO (Other use, unclassified); USES (Uses)  
(solvents in dope casting of polymer membranes; manufacture of membrane-electrode assembly of polymer-electrolyte fuel cells by using aromatic polymers)

L51 ANSWER 14 OF 18 HCAPLUS COPYRIGHT 2008 ACS on STN  
 ACCESSION NUMBER: 2007:63572 HCAPLUS Full-text  
 DOCUMENT NUMBER: 146:166444  
 TITLE: Membrane-electrode assemblies for solid polymer fuel

## 10/714,394-267960-EIC 1700 SEARCH

INVENTOR(S): cells  
Kawai, Junji; Ohtsuki, Toshihiro; Yamamoto,  
Takanobu; Komatsu, Satoshi; Fukuda, Kaoru;  
Takahashi, Ryoichiro; Shinkai, Hiroshi  
PATENT ASSIGNEE(S): Jsr Corporation, Japan; Honda Motor Co., Ltd.  
SOURCE: U.S. Pat. Appl. Publ., 15pp.  
CODEN: USXXCO  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 20070015041	A1	20070118	US 2006-485618	2006 0713
JP 2007026819	A	20070201	JP 2005-205658	2005 0714
PRIORITY APPLN. INFO.:			JP 2005-205658	A 2005 0714

ED Entered STN: 19 Jan 2007

AB Membrane-electrode assemblies are provided which have polymer electrolyte membranes capable of maintaining an adequately wet condition even at high temps. and have superior generating properties. The membrane-electrode assembly includes an ion exchange resin membrane, an anode catalyst layer including catalyst -supported carbon and an ion exchange resin, and a cathode catalyst layer including catalyst-supported carbon and an ion exchange resin, the anode catalyst layer including a binder component of which the ion exchange capacity is higher than that of a binder component in the cathode catalyst layer, and/or the anode catalyst layer including an ion exchange resin layer of which the water content is higher than that of anion exchange resin layer of the cathode catalyst layer.

IT 7440-44-0, Carbon, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(catalyst-supported; membrane-electrode assemblies for solid polymer fuel cells)

RN 7440-44-0 HCAPLUS

CN Carbon (CA INDEX NAME)

C

IT 597014-65-2P 920267-69-2P

RL: SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(membrane-electrode assemblies for solid polymer fuel cells)

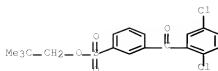
RN 897014-65-2 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with bis(4-chlorophenyl)methanone, 1,1'-sulfonylbis[4-chlorobenzene] and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (CA INDEX NAME)

CM 1

CRN 847972-43-4

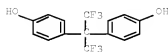
CMF C18 H18 C12 O4 S



CM 2

CRN 1478-61-1

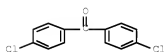
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

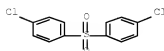
CMF C13 H8 Cl2 O



CM 4

CRN 80-07-9

CMF C12 H8 Cl2 O2 S



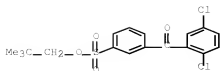
RN 920267-69-2 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with 2,6-dichlorobenzonitrile and 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (CA INDEX NAME)

CM 1

CRN 847972-43-4

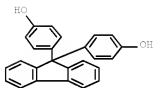
CMF C18 H18 Cl2 O4 S



CM 2

CRM 3236-71-3

CMF C25 H18 O2



CM 3

CRM 1194-65-6

CMF C7 H3 Cl2 N



INCL 429042000; 429044000; 429030000; 429033000  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38  
 ST membrane electrode assembly solid polymer  
 fuel cell  
 IT Fuel cell electrodes  
 Fuel cell electrolytes  
 Ion exchangers  
 (membrane-electrode assemblies for solid  
 polymer fuel cells)  
 IT Fuel cells  
 (polymer electrolyte; membrane-  
 electrode assemblies for solid polymer fuel  
 cells)  
 IT "440-44-0, Carbon, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (catalyst-supported; membrane-  
 electrode assemblies for solid polymer fuel  
 cells)  
 IT 7440-06-4, Platinum, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (membrane-electrode assemblies for solid



polymer fuel cells)

IT 911123-33-6P  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (membrane-electrode assemblies for solid  
 polymer fuel cells)

IT 128116-47-2P 397014-65-2P 920267-69-2P  
 RL: SPN (Synthetic preparation); TEM (Technical or engineered  
 material use); PREP (Preparation); USES (Uses)  
 (membrane-electrode assemblies for solid  
 polymer fuel cells)

IT 194739-90-7, YTZ  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (membrane-electrode assemblies for solid  
 polymer fuel cells)

L51 ANSWER 15 OF 18 HCAPLUS COPYRIGHT 2008 ACS on STN

ACCESSION NUMBER: 2007:59243 HCAPLUS Full-text

DOCUMENT NUMBER: 146:166415

TITLE: Solid polymer electrolytes  
 , proton conducting films,  
 electrode electrolytes,  
 electrode pastes, and membrane  
 electrode assemblies

INVENTOR(S): Okada, Takashi; Yamakawa, Yoshitaka; Otsuki,  
 Toshitaka; Goto, Kohei; Fukuda, Kaoru;  
 Shinkai, Hiroshi; Takahashi, Ryoichiro

PATENT ASSIGNEE(S): JSR Ltd., Japan; Honda Motor Co., Ltd.

SOURCE: Jpn. Kokai Tokkyo Koho, 24pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

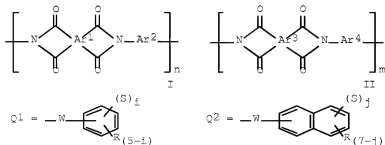
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2007012310	A	20070118	JP 2005-188447	2005 0628

PRIORITY APPLN. INFO.: JP 2005-188447

2005  
0628

ED Entered STN: 18 Jan 2007

GI



## 10/714,394-267960-EIC 1700 SEARCH

AB Solid polymer electrolytes comprising copolymer containing protonic acid group-containing structural repeating unit I and protonic acid group-free structural repeating unit II (Ar1, Ar3 = tetravalent organic group containing aromatic ring; Ar2, Ar4 = bivalent organic group containing C6-25 aromatic ring; Ar1 and/or Ar2 = Q1, Q2; W = CO, SO2, SO, CONH, CO2 (CF2)k, C(CF3)2; S = protonic acid group; R = H, F, (fluoro)alkyl, aryl; i = integer of 1-5; j = integer of 1-7; k = integer of 1-10; n, m = pos. integer). Protonic conducting films and electrode electrolytes comprising the electrolytes, electrode pastes containing the electrode electrolytes, C-supported catalysts, and solvent, and membrane electrode assemblies including the electrolytes as the protonic conductors and/or the electrodes are also claimed. The electrolytes are thermally and dimensionally stable.

IT 7440-44-0, Carbon, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (catalyst support in electrode paste;  
 sulfonated F-containing polyimide electrolytes for fuel  
 cells)

RN 7440-44-0 HCAPLUS

CN Carbon (CA INDEX NAME)

C

IT 919836-87-2P 919836-84-3P 919836-86-5P  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered  
 material use); PREP (Preparation); USES (Uses)  
 (sulfonated F-containing polyimide electrolytes for fuel  
 cells)

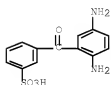
RN 919836-83-2 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-diaminobenzoyl)-, polymer with  
 1H,3H-benzo[1,2-c:4,5-c']difuran-1,3,5,7-tetrone and  
 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis(4,1-  
 phenyleneoxy)bis[benzenamine], block (CA INDEX NAME)

CM 1

CRN 919836-82-1

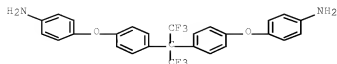
CMF C13 H12 N2 O4 S



CM 2

CRN 69563-88-8

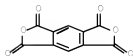
CMF C27 H20 F6 N2 O2



CM 3

CRN 89-32-7

CMF C10 H2 O6



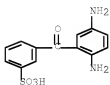
RN 919836-84-3 HCAPLUS

CM Benzenesulfonic acid, 3-(2,5-diaminobenzoyl)-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and 4,4'-[[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis(4,1-phenyleneoxy)]bis[benzenamine], block (CA INDEX NAME)

CM 1

CRN 919836-82-1

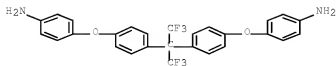
CMF C13 H12 N2 O4 S



CM 2

CRN 69563-88-8

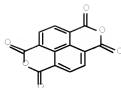
CMF C27 H20 F6 N2 O2



CM 3

CRN 81-30-1

CMF C14 H4 O6



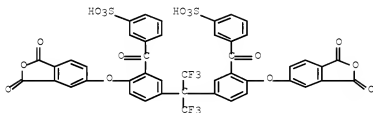
RN 919836-86-5 HCAPLUS

CN Benzenesulfonic acid, 3,3'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[[6-[(1,3-dihydro-1,3-dioxo-5-isobenzofuranyl)oxy]-3,1-phenylene]carbonyl]]bis-, polymer with 1H,3H-benzo[1,2-c:4,5-c']difuran-1,3,5,7-tetrone and 4,4'-[[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis(4,1-phenyleneoxy)]bis[benzenamine], block (CA INDEX NAME)

CM 1

CRN 919836-85-4

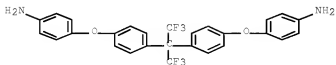
CMF C45 H22 F6 O16 S2



CM 2

CRN 69563-88-8

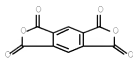
CMF C27 H20 F6 N2 O2



CM 3

CRN 89-32-7

CMF C10 H2 O6



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38  
 ST sulfonated polyimide polyelectrolyte fuel cell  
 ; polyimide polymer electrolyte fuel cell  
 IT Polyimides, uses  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (fluorine-contg, block, sulfonated; sulfonated F-containing polyimide electrolytes for fuel cells)  
 IT Fuel cell electrodes  
 (membrane electrode assemblies; sulfonated F-containing polyimide electrolytes for fuel cells)  
 IT Fluoropolymers, uses  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (polyimide-, block, sulfonated; sulfonated F-containing polyimide electrolytes for fuel cells)  
 IT Fuel cells  
 (polymer electrolyte; sulfonated F-containing polyimide electrolytes for fuel cells)  
 IT Ionic conductors  
 (proton; sulfonated F-containing polyimide electrolytes for fuel cells)  
 IT Paste electrodes  
 Polyelectrolytes  
 (sulfonated F-containing polyimide electrolytes for fuel cells)  
 IT 7440-44-0, Carbon, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (catalyst support in electrode paste; sulfonated F-containing polyimide electrolytes for fuel cells)  
 IT 919836-83-2P 919836-84-3P 919836-86-5P  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (sulfonated F-containing polyimide electrolytes for fuel cells)

L51 ANSWER 16 OF 18 HCAPLUS COPYRIGHT 2008 ACS ON STN  
 ACCESSION NUMBER: 2006:1066085 HCAPLUS Full-text  
 DOCUMENT NUMBER: 145:380471  
 TITLE: Electrode catalyst layers

for membrane-electrode  
 assemblies (MEA) of polymer-  
 electrolyte fuel  
 cells

INVENTOR(S): Kawai, Junji; Otsuki, Toshitaka; Fukuda,  
 Kaoru; Takahashi, Ryoichiro; Shinkai, Hiroshi  
 PATENT ASSIGNEE(S): JSR Ltd., Japan; Honda Motor Co., Ltd.  
 SOURCE: Jpn. Kokai Tokkyo Koho, 19pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

## 10/714,394-267960-EIC 1700 SEARCH

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006278233	A	20061012	JP 2005-98249	2005 0330

PRIORITY APPLN. INFO.:

JP 2005-98249

2005  
0330

ED Entered STN: 13 Oct 2006

AB The catalyst layers contain catalysts-carrying carbon particles, aromatic polymers bearing ionic conductive components, and elec. conductive fillers. Preferable structure of the polymers are also given. In manufacture of the catalyst layers, pastes containing the carbon particles, the aromatic polymers, and casting solvents are cast on substrates to form thin films which are then brought in contact with solns. containing poor solvents showing compatibility with the casting solvents so as to remove the casting solvents and simultaneously form pores. The catalyst layers show good balance between gas-diffusion or water-discharging characteristics, and electron/proton conductivity

IT 897014-65-2DP, 2,2-Bis(4-hydroxyphenyl)hexafluoropropane-4,4'-dichlorobenzophenone-4,4'-dichlorodiphenylsulfone-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate copolymer, hydrolyzed  
 RL: DEV (Device component use); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PYP (Physical process); PREP (Preparation); PROC (Process); USES (Uses)  
 (porous layer; in electrode catalyst layer containing aromatic polymer and conductive filler for polymer-electrolyte fuel cell)

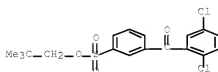
RN 897014-65-2 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with bis(4-chlorophenyl)methanone, 1,1'-sulfonylbis[4-chlorobenzene] and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (CA INDEX NAME)

CM 1

CRN 847972-43-4

CMF C18 H18 Cl2 O4 S



CM 2

CRN 1478-61-1

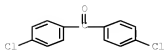
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CM 3

CRN 90-98-2

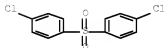
CMF C13 H8 C12 O



CM 4

CRN 80-07-9

CMF C12 H8 C12 O2 S



- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38, 76
- ST fuel cell electrode ionic  
conductor arom polymer; fluoropolymer polyether polyketone  
polysulfone electrode catalyst layer  
fuel cell; carbon conductor filler arom polymer  
electrode fuel cell
- IT Carbon black, uses  
RL: DEV (Device component use); MOA (Modifier or additive use);  
USES (Uses)  
(Carbon black 2300, elec. conductive filler; in  
electrode catalyst layer containing aromatic polymer  
and conductive filler for polymer-electrolyte  
fuel cell)
- IT Carbon fibers, uses  
RL: DEV (Device component use); MOA (Modifier or additive use);  
USES (Uses)  
(VGCF, elec. conductive filler; in electrode catalyst  
layer containing aromatic polymer and conductive filler for  
polymer-electrolyte fuel  
cell)
- IT Nanofibers  
Nanotubes  
(carbon, elec. conductive filler; in electrode  
catalyst layer containing aromatic polymer and conductive  
filler for polymer-electrolyte fuel  
cell)
- IT Fullerenes  
RL: DEV (Device component use); MOA (Modifier or additive use);  
USES (Uses)  
(elec. conductive filler; in electrode catalyst  
layer containing aromatic polymer and conductive filler for  
polymer-electrolyte fuel  
cell)
- IT Polysulfones, uses

# 10/714,394-267960-EIC 1700 SEARCH

- RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
(polyether-polyketone-, fluorine-containing; in electrode catalyst layer containing aromatic polymer and conductive filler for polymer-electrolyte fuel cell)
- IT Fluoropolymers, uses  
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
(polyether-polyketone-polysulfone-, in electrode catalyst layer containing aromatic polymer and conductive filler for polymer-electrolyte fuel cell)
- IT Polyketones  
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
(polyether-polysulfone-, fluorine-containing; in electrode catalyst layer containing aromatic polymer and conductive filler for polymer-electrolyte fuel cell)
- IT Polyethers, uses  
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
(polyketone-polysulfone-, fluorine-containing; in electrode catalyst layer containing aromatic polymer and conductive filler for polymer-electrolyte fuel cell)
- IT Ionic conductors  
(porous aromatic polymers; in electrode catalyst layer containing aromatic polymer and conductive filler for polymer-electrolyte fuel cell)
- IT Fuel cell electrodes  
(porous electrode catalyst layers in; electrode catalyst layer containing aromatic polymer and conductive filler for polymer-electrolyte fuel cell)
- IT 7440-06-4, Platinum, uses  
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)  
(catalyst, carried on carbon particles; in electrode catalyst layer containing aromatic polymer and conductive filler for polymer-electrolyte fuel cell)
- IT 7440-44-0, Carbon, uses  
RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)  
(particles, carrying platinum catalyst; in electrode catalyst layer containing aromatic polymer and conductive filler for polymer-electrolyte fuel cell)
- IT 897614-65-2DF, 2,2-Bis(4-hydroxyphenyl)hexafluoropropane-4,4'-dichlorobenzophenone-4,4'-dichlorodiphenylsulfone-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate copolymer, hydrolyzed  
RL: DEV (Device component use); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PYP (Physical process); PREP (Preparation); PROC (Process); USES (Uses)  
(porous layer; in electrode catalyst layer containing aromatic polymer and conductive filler for polymer-electrolyte fuel cell)
- IT 911123-33-6P, 2,2-Bis(4-hydroxyphenyl)hexafluoropropane-4,4'-dichlorobenzophenone-4,4'-dichlorodiphenylsulfone copolymer  
RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PYP (Physical process); RCT (Reactant); PREP (Preparation); PROC (Process); RACT (Reactant or reagent)  
(preparation and reaction of; in electrode catalyst layer containing aromatic polymer and conductive filler for polymer-electrolyte fuel cell)



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cell)  
 IT 409-21-2, Silicon carbide (SiC), uses  
 RL: DEV (Device component use); MOA (Modifier or additive use);  
 USES (Uses)  
 (whiskers, carbon-coated, conductive filler; in  
 electrode catalyst layer containing aromatic polymer  
 and conductive filler for polymer-electrolyte  
 fuel cell)

L51 ANSWER 17 OF 18 HCAPLUS COPYRIGHT 2008 ACS ON STN  
 ACCESSION NUMBER: 2006:1066080 HCAPLUS Full-text  
 DOCUMENT NUMBER: 145:400984  
 TITLE: Porous electrode catalyst  
 layers for membrane-  
 electrode assemblies (MEA) of  
 polymer-electrolyte  
 fuel cells, and their  
 manufacture  
 INVENTOR(S): Kawai, Junji; Goto, Kohei; Fukuda, Kaoru;  
 Takahashi, Ryoichiro; Shinkai, Hiroshi  
 PATENT ASSIGNEE(S): JSR Ltd., Japan; Honda Motor Co., Ltd.  
 SOURCE: Jpn. Kokai Tokkyo Koho, 20pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2006278232	A	20061012	JP 2005-98248	2005 0330

PRIORITY APPLN. INFO.:	JP 2005-98248	2005 0330
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ED Entered STN: 13 Oct 2006

AB The catalyst layers contain catalysts-carrying carbon particles and aromatic polymers bearing ionic conductive components, and have pore volume of 0.1-3.0 mL/g. Preferable structure of the polymers are also given. In manufacture of the catalyst layers, pastes containing the carbon particles, the aromatic polymers, and casting solvents are cast on substrates to form thin films which are then brought in contact with solns. containing poor solvents showing compatibility with the casting solvents so as to remove the casting solvents and simultaneously form pores. The catalyst layers show good balance between gas-diffusion or water-discharging characteristics, and electron/proton conductivity

IT 908342-30-3DP, 1,3-Bis(4-chlorobenzoyl)benzene-2,2-bis(4-hydroxyphenyl)hexafluoropropane-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate copolymer, hydrolyzed  
 RL: DEV (Device component use); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PYP (Physical process); PREP (Preparation); PROC (Process); USES (Uses)  
 (porous layer; manufacture of porous electrode catalyst layer containing aromatic polymer for MEA of polymer-electrolyte fuel cell)

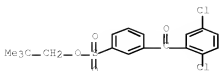
RN 908342-30-3 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with 1,1'-(1,3-phenylene)bis[1-(4-chlorophenyl)methanone] and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (CA INDEX NAME)

CM 1

CRN 847972-43-4

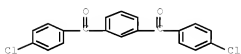
CMF C18 H18 Cl2 O4 S



CM 2

CRM 22198-44-3

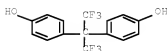
CMF C20 H12 Cl2 O2



CM 3

CRM 1478-61-1

CMF C15 H10 F6 O2



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38, 76

ST fuel cell MEA electrode porous arom  
polymer solvent casting; solvent casting porous arom polymer  
electrode manuf fuel cell;  
ionic conductor porous arom polymer fuel  
cell electrode; sulfo polyether polyketone  
porous electrode catalyst layer fuel  
cell

IT Polyketones

RL: DEV (Device component use); IMF (Industrial manufacture); PEP  
(Physical, engineering or chemical process); PYP (Physical  
process); PREP (Preparation); PROC (Process); USES (Uses)  
(polyether-, fluorine-containing, sulfo-containing, porous  
layer; manufacture of porous electrode catalyst  
layer containing aromatic polymer for MEA of polymer  
-electrolyte fuel cell)

IT Fluoropolymers, uses

RL: DEV (Device component use); IMF (Industrial manufacture); PEP  
(Physical, engineering or chemical process); PYP (Physical  
process); PREP (Preparation); PROC (Process); USES (Uses)  
(polyether-polyketone-, sulfo-containing, porous layer;  
manufacture of porous electrode catalyst layer)

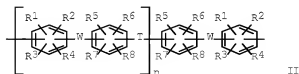
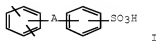
- containing aromatic polymer for MEA of polymer-electrolyte fuel cell)
- IT Polyethers, uses  
 RL: DEV (Device component use); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PYP (Physical process); PREP (Preparation); PROC (Process); USES (Uses)  
 (polyketone-, fluorine-containing, sulfo-containing, porous layer; manufacture of porous electrode catalyst layer containing aromatic polymer for MEA of polymer-electrolyte fuel cell)
- IT Ionic conductors  
 (porous aromatic polymers; manufacture of porous electrode catalyst layer containing aromatic polymer for MEA of polymer-electrolyte fuel cell)
- IT Fuel cell electrodes  
 (porous electrode catalyst layers in; porous electrode catalyst layer containing aromatic polymer for MEA of polymer-electrolyte fuel cell)
- IT Casting of polymeric materials  
 (solvent; porous electrode catalyst layer containing aromatic polymer for MEA of polymer-electrolyte fuel cell)
- IT 872-50-4, N-Methylpyrrolidone, uses  
 RL: NUU (Other use, unclassified); REM (Removal or disposal); PROC (Process); USES (Uses)  
 (casting solvent; in manufacture of porous electrode catalyst layer containing aromatic polymer for MEA of polymer-electrolyte fuel cell)
- IT 7440-06-4, Platinum, uses  
 RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)  
 (catalyst, carried on carbon particles; manufacture of porous electrode catalyst layer containing aromatic polymer for MEA of polymer-electrolyte fuel cell)
- IT 7440-44-0, Carbon, uses  
 RL: CAT (Catalyst use); DEV (Device component use); USES (Uses)  
 (particles, carrying platinum catalyst; manufacture of porous electrode catalyst layer containing aromatic polymer for MEA of polymer-electrolyte fuel cell)
- IT 108-88-3, Toluene, uses 123-86-4, n-Butyl acetate  
 RL: NUU (Other use, unclassified); USES (Uses)  
 (poor solvent for removing casting solvent; in manufacture of porous electrode catalyst layer containing aromatic polymer for MEA of polymer-electrolyte fuel cell)
- IT 908342-30-3DF, 1,3-Bis(4-chlorobenzoyl)benzene-2,2-bis(4-hydroxyphenyl)hexafluoropropane-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate copolymer, hydrolyzed  
 RL: DEV (Device component use); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PYP (Physical process); PREP (Preparation); PROC (Process); USES (Uses)  
 (porous layer; manufacture of porous electrode catalyst layer containing aromatic polymer for MEA of polymer-electrolyte fuel cell)
- IT 125776-08-1P 908342-29-0P, 1,3-Bis(4-chlorobenzoyl)benzene-2,2-bis(4-hydroxyphenyl)hexafluoropropane copolymer  
 RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PYP (Physical process); RCT (Reactant); PREP (Preparation); PROC (Process); RACT (Reactant or reagent)  
 (preparation and reaction of; in manufacture of porous electrode catalyst layer containing aromatic polymer for MEA of polymer-electrolyte fuel cell)

(cell)

L51 ANSWER 18 OF 18 HCAPLUS COPYRIGHT 2008 ACS on STN  
 ACCESSION NUMBER: 2004:402980 HCAPLUS Full-text  
 DOCUMENT NUMBER: 140:409627  
 TITLE: Electrode structure for  
 polymer electrolyte  
 fuel cells  
 INVENTOR(S): Sohma, Hiroshi; Iguchi, Masaru; Kanaoka,  
 Nagayuyki; Kaji, Hayato; Morikawa, Hiroshi;  
 Mitsuta, Naoki  
 PATENT ASSIGNEE(S): Honda Motor Co., Ltd., Japan  
 SOURCE: Eur. Pat. Appl., 26 pp.  
 CODEN: EPXXDW  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1420473	A1	20040519	EP 2003-26194	2003 1117
EP 1420473	B1	20060412		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
US 20040197632	A1	20041007	US 2003-714394	2003 1117
JP 2005158265	A	20050616	JP 2003-387362	2003 1118
PRIORITY APPLN. INFO.:			JP 2002-333143	A 2002 1118
			JP 2003-371047	A 2003 1030

ED Entered STN: 19 May 2004  
 GI



AB The present invention provides an electrode structure for polymer electrolyte fuel

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cells, inexpensive, and exhibiting excellent power production capacity and durability even under high temperature/low humidity conditions, and also provides a polymer electrolyte fuel cell which incorporates the same electrode structure. The present invention also provides an elec. device and transportation device, each incorporating the same polymer electrolyte fuel cell. The electrode structure comprises a pair of electrode catalyst layers, each containing a catalyst supported by carbon particles, and polymer electrolyte membrane placed between these electrode catalyst layers. The polymer electrolyte membrane is of a sulfonated polyarylene composed of 0.5 to 100% by mol of the first repeating unit represented by (I) and 0 to 99.5% by mol of the second repeating unit represented by (II): (wherein, A is a divalent organic group; and a benzene ring includes its derivative; -W- is a divalent electron attracting group; -T- is a divalent organic group; and R1 to R8 are a hydrogen atom or fluorine atom, an alkyl group, fluorine-substituted alkyl group, allyl group, aryl group or cyano group, and may be the same or different).

IT 690247-89-3D, ester hydrolysis products

RL: DEV (Device component use); USES (Uses)  
(electrode structure for polymer  
electrolyte fuel cells)

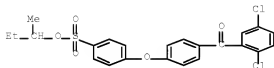
RN 690247-89-3 HCAPLUS

CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, 1-methylpropyl ester, polymer with bis(4-chlorophenyl)methanone and 4,4'-(2,2,2-trifluoro-1-(trifluoromethyl)ethylidene)bis[phenol], block (9CI) (CA INDEX NAME)

CM 1

CRN 690247-88-2

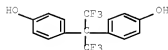
CMF C23 H20 Cl2 O5 S



CM 2

CRN 1478-61-1

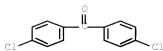
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O

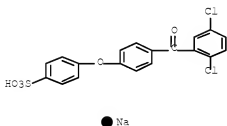


IT 663920-23-8P, Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, sodium salt 690247-88-2P  
690247-89-3P

RL: SPN (Synthetic preparation); PREP (Preparation)  
(electrode structure for polymer  
electrolyte fuel cells)

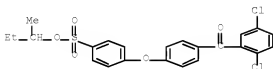
RN 663920-23-8 HCAPLUS

CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, sodium salt (1:1) (CA INDEX NAME)



RN 690247-88-2 HCAPLUS

CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, 1-methylpropyl ester (CA INDEX NAME)



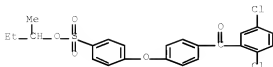
RN 690247-89-3 HCAPLUS

CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, 1-methylpropyl ester, polymer with bis(4-chlorophenyl)methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol], block (9CI) (CA INDEX NAME)

CM 1

CRN 690247-88-2

CMF C23 H20 Cl2 O5 S



CM 2

CRN 1478-61-1

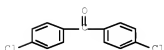
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O



IC ICM H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38ST electrode structure polymer  
electrolyte fuel cell

IT Catalysts

(electrocatalysts; electrode structure for  
polymer electrolyte fuel  
cells)

IT Fuel cell electrodes

(electrode structure for polymer  
electrolyte fuel cells)

IT Noble metals

RL: CAT (Catalyst use); USES (Uses)  
(electrode structure for polymer  
electrolyte fuel cells)

IT Fluoropolymers, uses

RL: MOA (Modifier or additive use); USES (Uses)  
(electrode structure for polymer  
electrolyte fuel cells)

IT Polyoxyalkylenes, uses

RL: MOA (Modifier or additive use); USES (Uses)  
(fluorine- and sulfo-containing, ionomers; electrode  
structure for polymer electrolyte  
fuel cells)

IT Fluoropolymers, uses

RL: MOA (Modifier or additive use); USES (Uses)  
(polyoxyalkylene-, sulfo-containing, ionomers; electrode  
structure for polymer electrolyte  
fuel cells)

IT Ionomers

RL: MOA (Modifier or additive use); USES (Uses)  
(polyoxyalkylenes, fluorine- and

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sulfo-containing; electrode structure  
for polymer electrolyte fuel  
cells)

IT Fuel cells  
(solid electrolyte; electrode  
structure for polymer electrolyte  
fuel cells)

IT 7440-06-4, Platinum, uses  
RL: CAT (Catalyst use); USES (Uses)  
(electrode structure for polymer  
electrolyte fuel cells)

IT 690247-89-3b, ester hydrolysis products  
RL: DEV (Device component use); USES (Uses)  
(electrode structure for polymer  
electrolyte fuel cells)

IT 9002-84-0, Ptfе  
RL: MOA (Modifier or additive use); USES (Uses)  
(electrode structure for polymer  
electrolyte fuel cells)

IT 122325-09-1P 663920-23-8P, Benzenesulfonic acid,  
4-[4-(2,5-dichlorobenzoyl)phenoxy]-, sodium salt 663920-24-9P,  
4-[4-(2,5-Dichlorobenzoyl)phenoxy]benzenesulfonyl chloride  
690247-88-2P 690247-89-3P  
RL: SPN (Synthetic preparation); PREP (Preparation)  
(electrode structure for polymer  
electrolyte fuel cells)

IT 7440-44-0, Carbon, uses  
RL: CAT (Catalyst use); USES (Uses)  
(support; electrode structure for polymer  
electrolyte fuel cells)



FULL SEARCH HISTORY

=&gt; d his nofile

(FILE 'HOME' ENTERED AT 09:48:22 ON 13 AUG 2008)

FILE 'HCAPLUS' ENTERED AT 09:48:54 ON 13 AUG 2008

L1 1 SEA ABB=ON PLU=ON US20040197632/PN  
D ALL  
SEL RN

FILE 'REGISTRY' ENTERED AT 09:51:42 ON 13 AUG 2008

L2 8 SEA ABB=ON PLU=ON (690247-89-3/BI OR 122325-09-1/BI  
OR 663920-23-8/BI OR 663920-24-9/BI OR 690247-88-2/BI  
OR 7440-06-4/BI OR 7440-44-0/BI OR 9002-84-0/BI)  
D SCAN  
D SAV

FILE 'LREGISTRY' ENTERED AT 09:52:28 ON 13 AUG 2008

L3 STR

FILE 'REGISTRY' ENTERED AT 10:00:42 ON 13 AUG 2008

L4 50 SEA SSS SAM L3  
D 1-2 STR RSD  
E 2 46.150/RID  
E 46.150/RID  
E 46.150/RID 25

FILE 'STNGUIDE' ENTERED AT 10:02:49 ON 13 AUG 2008

FILE 'HCAPLUS' ENTERED AT 10:03:50 ON 13 AUG 2008

E ELECTRON DONOR/CT  
E ELECTRON ATTRACT/CT  
E ELECTRON ACCEPTORS/CT  
E E3+ALL

L5 94214 SEA ABB=ON PLU=ON "ELECTRON ACCEPTORS"+MAX/CT

FILE 'REGISTRY' ENTERED AT 10:07:07 ON 13 AUG 2008

FILE 'STNGUIDE' ENTERED AT 10:11:46 ON 13 AUG 2008

FILE 'LREGISTRY' ENTERED AT 10:16:04 ON 13 AUG 2008

L6 STR L3

FILE 'REGISTRY' ENTERED AT 10:18:24 ON 13 AUG 2008

L7 50 SEA SSS SAM L6  
L8 16298 SEA SSS FUL L6  
SAV TEMP L8 WEI394REG/A  
L9 3 SEA ABB=ON PLU=ON L2 AND L8  
D SCAN

FILE 'LREGISTRY' ENTERED AT 10:19:40 ON 13 AUG 2008

L10 STR L6  
L11 STR L10

FILE 'REGISTRY' ENTERED AT 10:35:11 ON 13 AUG 2008

D SCAN L9  
L12 50 SEA SUB=L8 SSS SAM L11  
L13 3230 SEA SUB=L8 SSS FUL L11  
SAV TEMP L13 WEI394REG/A  
L14 3 SEA ABB=ON PLU=ON L2 AND L13  
D SCAN

FILE 'LREGISTRY' ENTERED AT 10:37:41 ON 13 AUG 2008

D QUE  
L15 STR L11

## 10/714,394-267960-EIC 1700 SEARCH

L16

STR L15

FILE 'REGISTRY' ENTERED AT 10:40:28 ON 13 AUG 2008

L17 12 SEA SUB=L8 SSS SAM L15 AND L16  
 L18 153 SEA SUB=L8 SSS FUL L15 AND L16  
 L19 1 SEA ABB=ON PLU=ON L18 AND L2  
 D SCAN

FILE 'HCAPLUS' ENTERED AT 10:42:12 ON 13 AUG 2008

L20 157 SEA ABB=ON PLU=ON L18  
 L21 1 SEA ABB=ON PLU=ON L19  
 D SCAN  
 L22 2828 SEA ABB=ON PLU=ON L13  
 L23 0 SEA ABB=ON PLU=ON L22 AND L5  
 L24 10543 SEA ABB=ON PLU=ON L8  
 L25 13 SEA ABB=ON PLU=ON L8 AND L5  
 D 1-13 TI CC  
 D SCAN L1  
 L26 174487 SEA ABB=ON PLU=ON "FUEL CELLS"+MAX/CT  
 L27 89664 SEA ABB=ON PLU=ON FUEL(2A)CELL?  
 L28 197224 SEA ABB=ON PLU=ON L26 OR L27  
 L29 127 SEA ABB=ON PLU=ON L20 AND L28  
 L30 565 SEA ABB=ON PLU=ON L22 AND L28  
 L31 565 SEA ABB=ON PLU=ON L29 OR L30  
 L32 31323 SEA ABB=ON PLU=ON ?POLYM?(3A)ELECTROLYT?  
 L33 331 SEA ABB=ON PLU=ON L31 AND L32  
 L34 QUE ABB=ON PLU=ON MEMBRANE  
 L35 297 SEA ABB=ON PLU=ON L33 AND L34  
 L36 54625 SEA ABB=ON PLU=ON ION?(2A)CONDUCT?  
 L37 131 SEA ABB=ON PLU=ON L35 AND L36  
 D SCAN L1  
 E IONOMERS/CT  
 L38 267283 SEA ABB=ON PLU=ON IONOMERS+MAX/CT  
 L39 257 SEA ABB=ON PLU=ON L35 AND L38  
 L40 275 SEA ABB=ON PLU=ON L37 OR L39  
 L41 QUE ABB=ON PLU=ON CATALYST?  
 L42 QUE ABB=ON PLU=ON CATALYSTS+MAX/CT

FILE 'REGISTRY' ENTERED AT 10:53:45 ON 13 AUG 2008

L43 1 SEA ABB=ON PLU=ON 7440-44-0/RN

FILE 'HCAPLUS' ENTERED AT 10:53:54 ON 13 AUG 2008

L44 QUE ABB=ON PLU=ON L43 OR CARBON  
 L45 44912 SEA ABB=ON PLU=ON L44(3A)L41  
 L46 36069 SEA ABB=ON PLU=ON L44(L)L42  
 L47 21 SEA ABB=ON PLU=ON L40 AND (L45 OR L46)  
 L48 QUE ABB=ON PLU=ON ELECTROD? OR CATHOD? OR ANOD? OR  
 (NEGATIVE OR POSITIVE) (2A)ELECTROD?  
 L49 20 SEA ABB=ON PLU=ON L47 AND L48  
 L50 QUE ABB=ON PLU=ON FILM? OR THINFILM? OR LAYER? OR  
 OVERLAY? OR OVERLAID? OR LAMIN? OR LAMEL? OR MULTILAYER  
 ? OR SHEET? OR LEAF? OR FOIL? OR COAT? OR TOPCOAT? OR  
 OVERCOAT? OR VENEER? OR SHEATH? OR COVER? OR ENVELOP?  
 OR ENCASE? OR ENWRAP? OR OVERSPREAD? OR ENCAPSUL?  
 L51 18 SEA ABB=ON PLU=ON L49 AND L50  
 D SCAN L1  
 SAV TEMP L51 WEI394HCP/A  
 D QUE L51  
 D L51 1-18 IBIB ED ABS HITSTR HITIND